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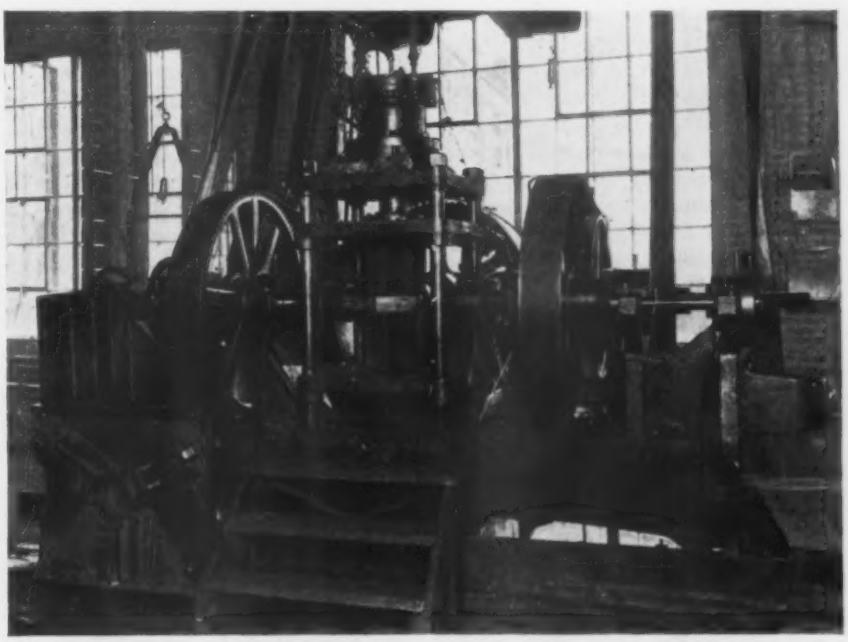
Production Methods at Fittings Plant

Tap-Making Machine, Special Tapping Equipment, Pattern Making Facilities and Scheme for Material Handling Are Features of Limbert Works

BY GILBERT L. LACHER

THE aim of every manufacturer is to reduce his costs and at the same time to improve, or at least to maintain, the quality of his product. One important element in costs is material handling, and this is steadily being reduced by improved routing of products through plants and by better mechanical equipment. Another great factor in costs is labor. While wages are dependent on the current condition of the labor market, which is beyond the control of the individual plant operator, the amount of labor consumed per pound of product manufactured is susceptible to reduction through the installation of labor-saving machines.



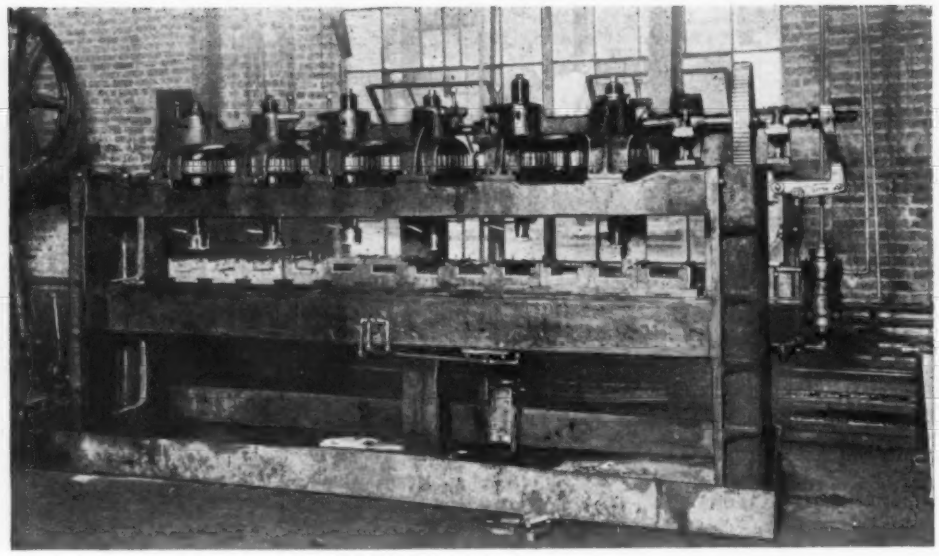
One of Two Special Tapping Machines Used for Tapping Large Fittings. In this case the work—an ell—is held by the pneumatic cylinder pressing from above. The double chuck standing to the left of the steps is used for holding flanges, the chuck fitting into the ways of the machine

In surveying his problem, the works manager must exercise ingenuity both in working out suitable methods and devising equipment and appliances. The problem is the same for all manufacturing plants so far as broad purposes are concerned. The application, however, differs for every industry and each plant in that industry. The works of Geo. B. Limbert & Co. at East Chicago, Ind., is an example of the successful adaptation of modern operating principles to the peculiar needs of one branch of manufacture. The company, which has been a producer of fittings and flanges for many years, suffered the loss of most of its plant through fire about two years ago. In rebuilding, the management sought to introduce all improvements in plant arrangement and equipment which long experience indicated were practicable. The utmost attention was given to the design of the new structures with a view to effecting the best routing of materials. Likewise equipment was provided both to reduce costs and to insure a better product.

In the manufacturing routine of the plant, the first step is the production of castings. These are subsequently tapped or faced and drilled, and stored for shipment. The company also jobs both wrought iron and steel pipe, having facilities for threading it, cutting it to length and bending it. The pipe bending and cutting shop and the foundry, core room and cleaning room are the only units of the original plant still standing, the remainder consisting of new buildings.

As will be noted by examining the plan view, the plant location is excellent both for the receipt of raw materials and for the shipment of the finished product. A spur from three large railroads and three belt lines extends the whole length of the raw material storage yard, which is parallel to and adjacent to the foundry. Another siding extends between the pipe storage and bending shop and a loading platform next to the machine shop. Here consignments of pipe are received and finished products of the plant are loaded for shipment.

Coke, pig iron, scrap, limestone and sand are transferred from railroad cars to the raw material storage by locomotive crane. Tote boxes are filled with these materials as needed and are transported to the foundry by electric lift trucks manufactured by the Automatic Transportation Co., Buffalo, N. Y. Truck loads of iron, coke and limestone are run onto an elevator in the



In This Multiple Tapping Machine Two Chucks Have Been Provided for Each Spindle, One Chuck Being Loaded While the Work Held in the Other Is Being Tapped. The position of the chucks is shifted by air. The control of the spindles is entirely automatic

cupola house and raised to the charging floor. The trucks are also used for conveying sand from storage into the foundry, for moving ladles of hot metal from the cupola to the various molding floors, for transporting patterns and flasks from and to storage, and for taking the castings from foundry to cleaning room.

All of the molding floors, except a pit for large castings, which is served by a hydraulic swing crane with a 20-ft. beam, are commanded by overhead hand-power cranes of the combination bridge and monorail type, which were manufactured by the Louden Machinery Co., Fairfield, Iowa. The bridge operates the length of each molding floor, and the monorail hoist operates across the bridge, thus making it possible to reach every part of the floor. At the same time, by connecting several bridges, a hoist may be passed from one floor to another. Every molding floor, except the pit, served by the swing crane, is equipped with a molding machine, various types being used for different classes of work. Iron is melted in a 72-in. Whiting cupola, which has been lined down to 54 in. It melts up to 75 tons daily.

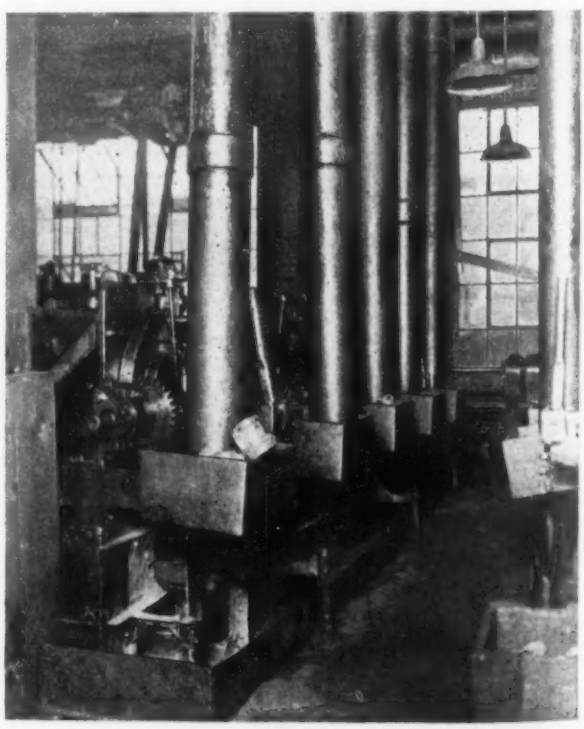
The company has effected marked economies both in making cores and patterns. Both dry and green sand cores are made. About 50 per cent of the dry sand cores—all those four inches in diameter and under—are made mechanically. In this process the core sand is sifted in a motor-driven gyratory riddle and is mixed in a rotary motor-driven Sly mixer. It is then transferred to the hopper of a core machine manufactured by the Demmler Mfg. Co., Kewanee, Ill. In this machine core boxes are pneumatically rammed with sand fed from the hopper above, whereupon the cores are laid in core driers arranged on a plate preparatory for baking. It has been found that the Demmler machine operated by two men will produce as much work as five or six core makers. Another machine of this type, entirely automatic in operation, has been purchased and is expected to perform the work of eight to 10 coremakers.

The present core shop, which is adjacent to the molding pit served by the swing crane, will soon be moved to a new core room which is being provided in a building housing the pattern shop and storage. Here the two Demmler machines will be set up and two new gas-heated core ovens, one of the car type for cores up to 48 in., will be built by the company's own forces. The space now occupied by the core shop, together with an addition to it, which is now under construction, will add 40 ft. to the foundry, increasing molding capacity accordingly.

The pattern storage, the carpenter shop, and the pattern shop are located in a fireproof building with concrete floors and columns, brick walls and Federal Cement Tile Co. roof. The carpenter shop, which is used for making and repairing wooden flasks, is located on the first floor. Here also is the storage for wooden patterns and core boxes, separate from the shop by double fire doors. In one corner, adjacent to the carpenter shop, is a charging room, where the batteries of the elevating trucks are charged.

On the second floor is the pattern shop and metal pattern storage. Both the metal and wooden patterns and core boxes are stored in adjustable self-locking steel shelves furnished by the Durand Steel Locker Co., Chicago. All patterns and core boxes are indexed, so that they can be located at a moment's notice by referring to the pattern records.

Patterns are made of wood, iron, brass and aluminum. Aluminum is melted over a Bunsen burner in the pattern shop and is there poured into suitable molds. Aluminum patterns have numerous advantages. They are lighter in weight; they are easy for the pattern maker to work; they draw sand better than patterns made of other materials. Furthermore,



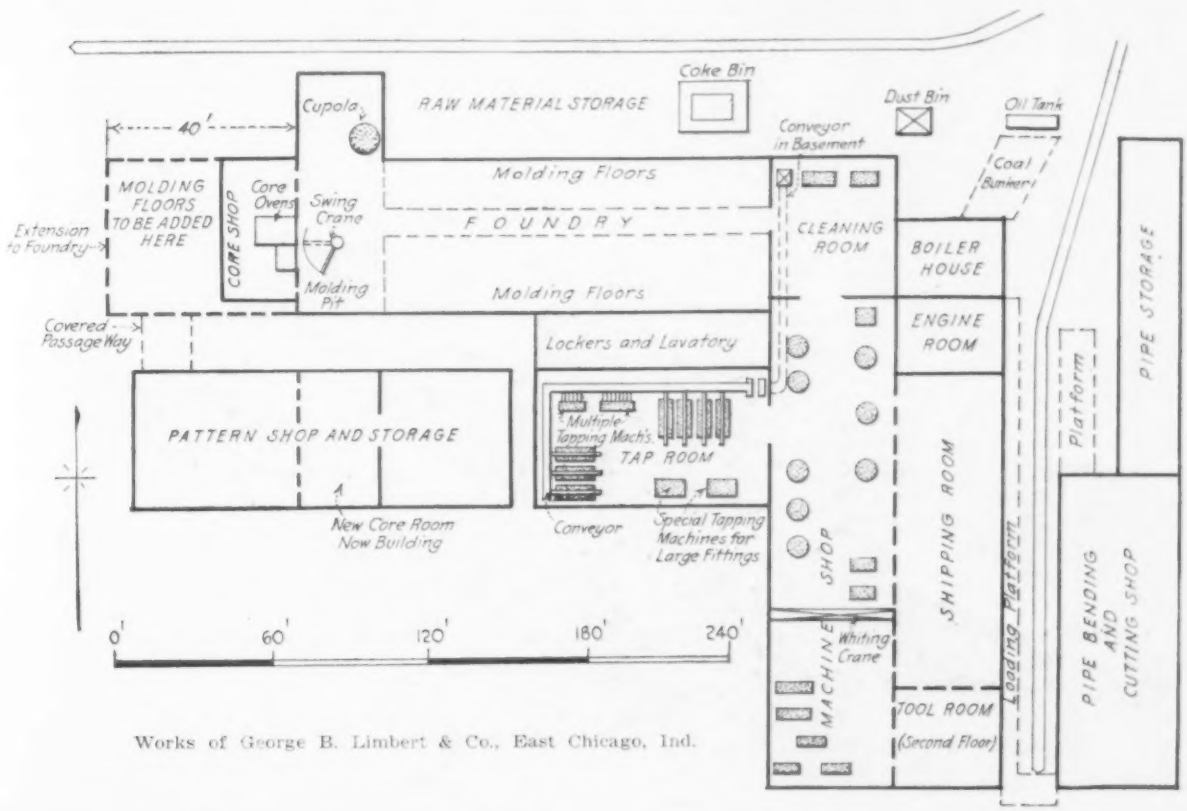
A Battery of Tapping Machines, Showing the Tubes Through Which Work Is Dropped from the Floor Above and the Conveyor Below Which Carries the Finished Fittings Away to Storage

it is necessary to leave very little finish on aluminum patterns, because there is little or no shrinkage in the cooling of the metal. In the case of many patterns only a file finish need be provided for. Through the use of aluminum patterns it has been possible to reduce the weight of various fittings. Thus a two-inch ell, which formerly weighed four and one-half pounds as it came from the mold, now weighs only four pounds.

Another feature of the pattern shop is a core box machine, through the use of which the time required for making core boxes has been sharply reduced. It formerly took seven to eight hours to make a six-inch ell core box. The machine cuts it out in 10 min. after it has been built up rough. Joseph A. Crane & Co., Rochester, N. Y., built the machine, but it was subsequently modified in its construction by the Limbert company's engineers. Originally the knife could not cut a box larger than 12 in. in inside diameter. It is now able to cut boxes up to 20 in. in diameter. The machine is relatively simple in its design. The knife is motor-driven and when not in use is withdrawn under the table of the machine. An adjustable guide extending across the top of table determines the position of the core box with reference to the knife. The core box is placed against the guide and when the knife has been adjusted to the proper height above the surface of the table and is set in rotation, the box is shoved slowly against it, the direction of the movement of the box being at right angles with the plane of the knife.

Core boxes are also made of metal, these being used exclusively in making green sand cores. For certain classes of castings, particularly where a clean inside finish is desirable, the Limbert company has found green sand cores eminently satisfactory. These cores are made on the molding floors where they are to be used. One-half of a core is made at one time, the sand being rammed into the core box, which is then turned upside down, leaving the half core on the top of the molding bench with the flat side down. Then drag of the mold, face downward, is slipped over the core, following which it is turned over and another core box is superimposed over the half core in the drag and then removed, leaving the top half of the core in place. The last step is the fitting of the cope over the core as it rests in the drag. Both halves of the core are dusted with parting sand before they are set.

Adjacent to the foundry is the cleaning room, to which all castings are taken after the molds are shaken out. After cleaning, the castings are passed by chute to a belt conveyor in the basement, which carries them to the boot of a bucket elevator which hoists them to the second floor directly above the tap room. Here they are sorted out and work which is to be tapped is passed down tubes to the various tapping machines on the floor below, while the pieces to be faced and drilled are lowered by elevator to the machine shop. All of the machines are placed so that as soon as work is tapped it may be carried away by belt conveyor. In the case of several batteries of standard type Williams, White & Co. tapping machines, the belt conveyor is directly underneath. In other instances chutes connect the machines with the conveyor. The latter carries all finished pieces to a chute through which they are discharged into the basement where they are sorted and stored.

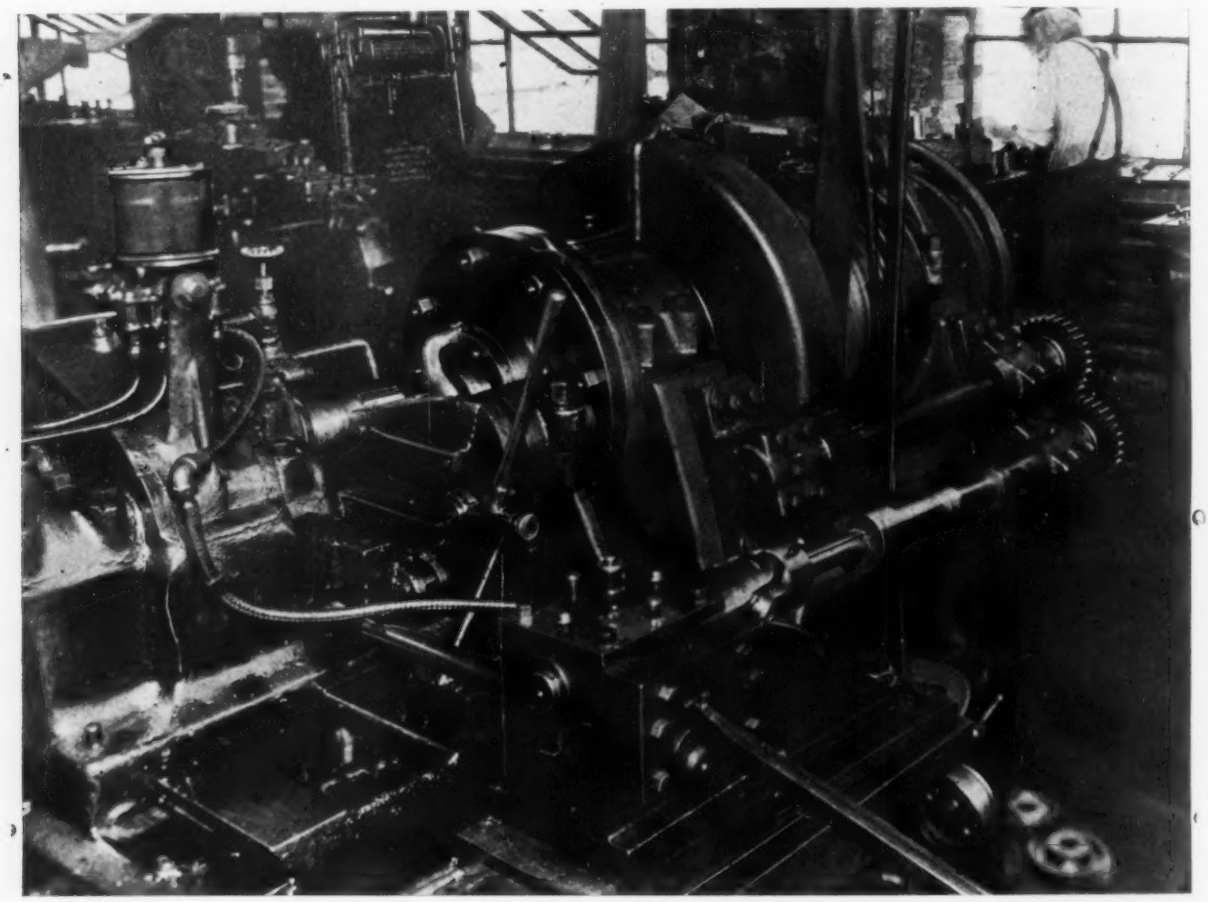


Works of George B. Limbert & Co., East Chicago, Ind.

A number of special tapping machines were designed and constructed by the company to handle large fittings. One of them is used for tapping elbows, tees, crosses and flanges. Flanges are held by a double chuck which fits into the ways on the bed. Fittings are held by an air cylinder pressing from above. Through this manner of holding the work, as many as four taps (in the case of a cross) may be driven into the work at once. The machine has a capacity to tap ells, tees and crosses from four to six inches in inside diameter, and flanges—both standard and extra heavy—from 6 in. to 16 in. in diameter. Another machine of this type is used principally for tapping 45-deg. elbows, although it can be used for other operations also. In this case a screwdown is used for holding the work, because it was found that a pneumatic cylinder would not hold a 45-deg. ell securely.

There are also two multiple tapping machines

which are used to tap flanges, flange unions and return bends. One of these is a four-spindle machine equipped with two sets of chucks per spindle, one chuck being loaded while the spindle is tapping the work on the other chuck. At the end of each spindle operation, the positions of the chucks are reversed, the chucks which have been loaded being shoved under the spindles while the completed work is passed from the other chucks down chutes to the belt conveying system. The other machine, a six-spindle tapping machine, was constructed by the King Machine Co., Chicago, according to the Limbert company's own design. It is unique in its construction, control of the spindles being automatic, while the 12 work chucks are shifted back and forth by the operator pneumatically. In this case also the idle work chucks are loaded while the spindles are working on the other chucks.



Taps Are Made on a Thread Milling Machine Modified for the Purpose. A tailstock was provided to hold the idle end of the work and a backing-off attachment relieves the hob as it passes over each flute in the tap preparatory to entering the next land

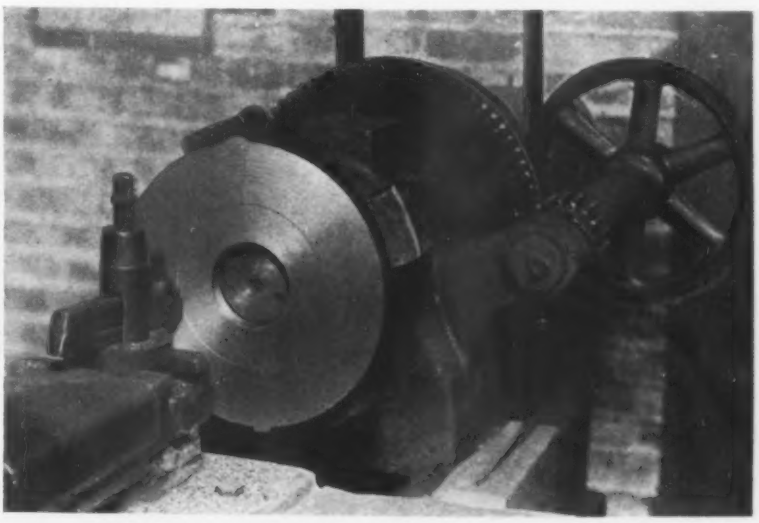
The control of the spindles commands particular attention. From a lever attached to the end of the driving shaft of the machine is suspended a link to which trip dogs are fastened, the upper one tripping one air valve and the lower one another valve, each at the proper time in the cycle of operation. The gap between the dogs and the air valves can be regulated so as to limit the spindles to various revolutions per operation. With the tapping of one of the valves a pneumatic cylinder on the counter shaft above the machine is actuated, the plunger shifting a clutch, thereby reversing the operation of the belt and causing the spindles to be withdrawn from the work preparatory to the next operation. After the spindles have been reversed the same number of revolutions they take when tapping the work, the other air valve is tripped and the operation of the air cylinder is reversed, again changing the direction of the belt and causing the spindles to be driven into the work.

All of the taps used by the company are made in a well-equipped tool room. Taps up to six inches in diameter are made in a Smalley-General thread milling machine which was fitted up by the Limbert engineers for this work. After the flutes have been milled, this machine will thread a double end tap completely in five minutes. The work is held in a dog which is rotated by a face plate on the headstock of the machine. To hold the idle end of the work, a tailstock was provided by the Limbert company. It is to be noted that both the hob and the work rotate simultaneously, but that the rotation of the work is much slower than that of the tool. One-half of a double end tap is completely threaded in one rotation of the work-driving spindle. To provide all the speeds required, the countershaft was equipped with the necessary cone pulleys. The machine was provided with a backing-off attachment to take up the backlash on the hob and also to provide clearance when the tool is entering a land in the tap. This attachment is operated by a flexible shaft geared to the main spindle. The shaft drives a cam which draws the hob toward the work while cutting, relieving it when it passes over a flute in the tap preparatory to entering the next land. A counterweight on a beam throws the tool out of contact with the work when the tension on the hob is relieved in the cycle of the operation of the cam.

The drilling and facing of flanges and flange fittings is done in the main machine shop, which adjoins the tap room. The equipment in this department embraces three cluster drilling machines—a 12-spindle, a 10-spindle and an 8-spindle, two radial drilling machines, and five boring mills which will handle 1-in. to 18-in. stock. The shop is commanded by a Whiting 7½-ton electric traveling crane, which is used to set up heavy jobs on the machines. There are also a number of engine lathes used for facing. The lathes are equipped with chucks holding plugs on which the flanges are

threaded. The advantage of screwing flanges on plugs is that it is unnecessary to center the work, as would be required if the flanges were held in chucks. By this arrangement the operator can feel sure that the face of the flange is square with the tapping chamber. Different plugs, of course, are used for different sizes of flanges.

Flange fittings are used on large pipe—generally on pipe above four inches in diameter. Fittings this size are tapped only when it is specified by the customer. Smaller pipe usually takes screw fittings. Pipe is threaded and faced in the pipe shop on three long engine lathes, which will thread work up to 24 in. in diameter. Pipe is bent to order on two bending tables. Before bending, the pipe is heated in oil furnaces, after which it is transferred to the table by an overhead monorail hoist. The tops of the tables are perforated with numerous holes, so that pegs can be so placed as to produce almost any curvature desired. In the bending operation a winch is used to pull the pipe around the pegs, one end of the pipe being held fast against a block.



Flanges to Be Faced Are Screwed on Plugs Rather Than Held in Chucks. This practice makes it unnecessary to center the work, as the operator can feel sure that the face of the flange is square with the tapping chamber

Next to the machine shop and adjacent to the loading platform is a shipping room. Material for shipment is brought to this floor from storage below by an elevator. Orders are generally taken right out of stock, as it is the policy of the company to keep a considerable supply of all of its products on hand at all times. This is necessary so that quantities of the same size of product may be put through the shop at one time.

Allegheny Steel Co. Improvements

The Allegheny Steel Co., Brackenridge, Pa., has increased its capital stock from $3,200,000 to $6,315,200 by declaring a stock dividend. The company does not contemplate any material additions to its plants at present, but has under way the remodeling of its blooming mill so that it will be able to roll sheet bars on this mill. When the changes are completed this mill will be able to roll blooms, billets, slabs and sheet bars, and will have a capacity of 700 to 800 tons of sheet bars per day. For some time the company's sheet bar capacity has been insufficient to supply its 21 hot sheet mills. Several months ago galvanizing equipment was installed and the company is now a large producer of all grades of sheets, both black and galvanized. Its large plate mills have been closed for some time, owing to the low prices at which plates have been selling.

Six Worcester, Mass., plants, including the Central Works, American Steel & Wire Co., and the National Works, Wickwire Spencer Steel Corporation, had perfect scores as to lost time accidents in April, in a contest conducted by the Worcester Branch, National Safety Council. The two steel plants mentioned had perfect accident records for the four months ending with April.

The Machine Shop Is an Exceptionally Light and Lofty Bay, Served by Overhead Crane and Equipped with Multiple Spindle Drilling Machines, Radial Drilling Machines, Boring Mills and Engine Lathes

ETHICS IN BUSINESS

Judge Gary Says Conditions Have Greatly Improved in a Few Years

Elbert H. Gary, chairman United States Steel Corporation, delivered an address at the annual luncheon of the Law Alumni, Northwestern University, Evanston, Ill., Saturday, June 17, when the honorary degree of Doctor of Laws was conferred upon him in connection with the commencement exercises. Judge Gary's speech was on Ethics in Business, and he made a very interesting comparison of old and new methods of business. He said that not many years ago, perhaps not more than a score, the managers of some of the large private business corporations apparently believed that if their conduct was within the strict and technical rules of law it was immune from public or private attack; that if the provision of no public law was violated the corporation should be permitted to secure unlimited profit and might treat indifferently its customers, its employees, its competitors and even the general public; and not a few officials, in consonance with the same line of reasoning, were inclined to take advantage of inside, advance information to promote their own pecuniary interests to the prejudice of the shareholders generally. By such as these moral principles were ignored.

The Rule of Might

Judge Gary said that by the old regime the rule of might over right prevailed. In business, the Golden Rule was given no thought, certainly no place. Competition was tyrannical and destructive. Weaker competitors were forced out of business often by means not only unethical but severe and brutal. Employees were not given just consideration. The wage rates were adjusted strictly in accordance with the laws of supply and demand. Employees were also governed largely by selfish motives and in many cases were arbitrary, unreasonable and cruel. This condition resulted in great hardship to the general purchasing and consuming public.

Change for the Better

Turning from this picture of conditions in the past, Judge Gary spoke on the present, saying in part:

It may be asserted with absolute confidence that within the last twenty years or more there has been a decided change in the standards and conduct of business. To my personal knowledge, many of the most intelligent managers of business affairs, some very large and others smaller, who have laid down the cares and difficulties of this life, before their final departure completely changed their opinions and reversed their methods concerning ethical questions. This applies also to many who are still living. Hundreds upon hundreds, yes thousands upon thousands of business men, all over this country, who 20 years ago believed that the subject of ethics had little, if any, rightful place in business conduct, now assert and insist that it is essential and controlling. A man of high intelligence and probity about ten years since, while testifying in court, alluding to a certain other man who occupied the highest position in a large business concern, said: 'He introduced new rules into the business game.' I think it properly may be claimed multitudes of leading business men during the last two decades have voluntarily devoted more and more time and energy in a conscientious desire to conduct their business in accordance with the rules of propriety and honesty.

"Business throughout the United States is to-day transacted on a higher plane than ever before, though, of course, there is always need for further improvement. The world is surely growing better. If time permitted, many striking instances could be given."

Judge Gary said that public opinion has aroused and will always arouse the consciences of men and women. Another convincing reason for the noticeable changes in business ethics is that men realize that ethical management brings additional profits to business and sooner or later it pays in dollars and cents, for any man or concern that firmly establishes a reputation for honesty and fair dealing has a business asset of great pecuniary profit.

"Perhaps best of all," said Judge Gary, if the business man's conduct is sincerely believed by himself to be honest and proper, he will have the courage and strength to stand solid and immovable against any unworthy attack of the unscrupulous concerning his management."

Misguided Minds

In conclusion, Judge Gary said:

"As a passing suggestion it may be observed that henceforth the political party which pays the most attention to ethics is likely to secure endorsement by the majority of voters, including especially the women.

"In this greatest of all countries, rich in everything that is good and of real worth, we may be hopeful of the future. Beyond the horizon of our temporarily somewhat beclouded vision, the skies of temporal and moral prosperity are clear and bright. Let us be thankful that, under the power and rule and influence of incompetent or vicious men during the last few years, the world has not suffered more and that at present, in the United States at least, conditions and prospects are good. Let us consider distrustfully those who look darkly through glasses of their own construction, for we know they reflect simply the peculiarities of misinformed or misguided minds.

"The alumni of the great universities, whatever may be the extent of their business control or connections, have great opportunity to assist in moulding, by practice and precept, the new and improved structure of enlightenment which is needed throughout the world. Let us engrave our names as co-builders upon the foundation blocks of intellectual and moral granite."

Investigating Workmen's Compensation

H. D. Martin, medical director of the Pollak Steel Co., Cincinnati, and L. H. Van Matre, manager of the industrial division of the Cincinnati Chamber of Commerce, have been making a tour of Ohio cities, consulting manufacturers regarding the operations of the Ohio workmen's compensation law. Group meetings have been held in Cleveland, Toledo, Youngstown, Canton, Portsmouth, Dayton and Springfield at which complaints have been aired and suggestions advanced. The survey is being conducted at the instigation of the committee on workmen's compensation of the Cincinnati Chamber, of which M. E. Pollak, of the Pollak company is chairman and Mr. Martin is acting chairman.

Visits were also made to Washington, New York, Boston, Baltimore, Harrisburg and Charlestown, W. Va., to investigate the operation of compensation acts in other States. Mr. Martin says the investigation has disclosed that many of the complaints against the Ohio law are founded on misunderstanding, and he advocates a more thorough study of the act and its provisions on the part of employers.

Manufacturers throughout the State have shown a lively interest in the subject. The system of factory and workshop inspection in the State has been subjected to criticism, because of its inefficiency and the impractical suggestions advanced by inspectors.

A. W. Matlack, manager of the compensation department of LaBelle Iron Works, Steubenville, recommended to the committee that trade associations act in concert in attempting to iron out inequalities. He stated there could be a substantial reduction of disability resulting from accidents, and pointed out that manufacturers generally have no follow-up system in accidents.

The Tariff Division of the Department of Commerce has received word that the customs tariff of Nigeria has been further amended, effective April 28, this year, and fixes a duty of 10 per cent on corrugated iron sheets which were formerly free of duty.

The Cumberland Iron Works, Inc., Huntington, W. Va., with a plant for the manufacture of mine cars and mine equipment at Westmoreland, W. Va., has taken over the Star Car & Foundry Co., Huntington, W. Va.

Leaves from a Steel Melter's Notebook—V*

Details of Diagnosis and Treatment in the Case of a Sick Steel Plant in a Foreign Country—Aluminum as a Preventive of Skin Holes

BY HENRY D. HIBBARD

SOME years ago, while the great war was in its early stages, I was engaged to visit professionally a steel works in a foreign country to advise the owners how to increase the output of their open-hearth steel plant which was unsatisfactory. At the end of my journey I found a good new plant, comprising blast furnace, by-product coke ovens, pig-casting machine, basic open-hearth steel furnaces, blooming mill, rail and structural mill, tracks and appliances. The plant had not, indeed, been built with such prodigal use of steel as some of the American plants, but was, nevertheless, ample to deal with the 60-ton steel furnaces in all particulars as to charge, product and otherwise, when they were well operated. The only inadequate thing was the drop for breaking up into chargeable pieces the pit and ladle scrap.

The situation at the plant was rather unpleasant. Heats of steel were taking from 15 to 25 hours each to make, and in exceptional cases even longer. Even then they were as a rule cast too cold, so that a considerable part of the metal went into pit scrap and ladle skulls. The percentage of ingots was extremely low, running ostensibly about 85 per cent of the metallic part of the charge; that is, the combined weight of the crude iron and scrap steel, but not including the iron in the ore. The percentage of ingots was really less than 85 per cent, as the weight clerk confessed to me one day in a burst of confidence that the figures were falsified to make even that showing. The railroad track running out to the drop was piled high on both sides with thousands of tons of pit and ladle scrap. Never before had I seen a tenth as much at any one place. The drop was not equal to the task of breaking up more than a small fraction of the daily production of such scrap. Indeed, some of the pieces and skulls were so massive that they were practically unbreakable under a drop.

Early Plant Troubles Grow Worse

As stated, the plant was adequate for good practice. All the principal men on the steel furnaces had had experience at other plants, but most of them had lost their faith in the situation, chiefly blaming the plant for its poor showing. It had started off at a fair rate for a new plant, but then, instead of doing better as experience was gained, it did worse. The two things which were really bad and beyond their control were too high silicon in the pig iron they used and inferior quality of the silica bricks, which were made locally.

Before I got there, the steel superintendent, who had practically thrown up his hands, had left, and one of the melters had been made acting superintendent. The steel superintendent and the blast furnace superintendent had not been on speaking terms, as the former blamed the quality of iron supplied to him by the latter for some of his troubles, and with good reason, as will be told later. The blast furnace man claimed, however, that when the steel plant got such iron as they asked for they did no better work, and this was substantially true. He stated to me when I first got there his belief that the composition of the iron made no difference. Later he had other views, for reasons which will be referred to in the sequel.

As a result of the differing claims and circumstances, the management of the plant were uncertain as to what was really responsible for the poor showing, and therefore looked for help outside. The costs of the steel they had been able to ship were so high that something had to be done to lessen them.

Diagnosis

A glance into any of the steel furnaces showed a flame extending from the gas port but a little over half the length of the hearth, and totally inadequate for good melting. The hearth temperature was too low. The chimney dampers were all the way up, the air valves up 6 or 7 in., and the dust which had settled on the hand regulating wheels for the air valves and chimney dampers showed that they were never touched. For good work they must be adjusted from time to time to meet the variations in gas, stage of melting, and other things which affect the hearth temperature. At the end of a melt less heat is needed to be supplied to a furnace than during melting down. The pressure on the steam pipe blowing the producers was excessively high, about 50 lb. per sq. in. The regenerators were, in their upper, hottest parts, hardly more than red hot, say at a dull orange temperature. All these things were wrong.

For a good rate of melting the flame should sweep the whole length of the hearth, with tips of the flame entering the gas port at the far end on the way to the regenerators. An undue excess of air shortens the flame. There must, indeed, be some excess of air to have good combustion, say about 50 per cent more than the theoretical amount required to burn the gas, but too much air cools the hearth. So also does too little air, because of the poor combustion resulting, the flame then being smoky. Of course, the air is not measured, but a skillful furnaceman will graduate the quantity of air entering his furnace so that he has a proper flame at all times. When desiring full melting power, as during the melting down period, the flame should be ample in extent and be white and soft. In fact, a suspicion of smoke issuing from the stack, showing that the air valve is not too widely open, is better than too much air fed into the furnace.

These observations being made, the first thing to be done was to try the effect of less air, less steam and less chimney draft to see if by such means the regenerators and furnaces could be made properly hot. These changes were tried by the furnace men on one of the furnaces, but the improvement, though noticeable, was slight. The next day I ran a furnace myself for a while and tried all the variations of air, steam and chimney draft, but could not get a really good flame. This completed the diagnosis and showed that the trouble lay chiefly in the quality of the gas being made in the producers.

Improving the Gas

The next two weeks I spent mostly in the gas house, teaching the gas men how to make better gas. The producers were of an unfamiliar make, so I had to study out their peculiarities and teach the men as I went along. The producers were of the stationary type without grates, and had feeding mechanisms having three rates of speed. These variations in speed were obtained by driving a ratchet wheel either one-half a tooth, one tooth or one and a half teeth at each stroke of a reciprocating shaft carrying two pawls with overlapping motion. It eventually appeared that the slowest speed, or one-half a tooth to a stroke, was sufficient and that speed was usually employed. The coal we used was a fair quality of slack from a mine in the near neighborhood. It averaged about 37 per cent volatile matter, 11 per cent ash, and 1.6 per cent of

*No. I was published Oct. 27, 1921, at page 1065; No. II, Nov. 24, at page 1337; No. III, Feb. 16, 1922, at page 465; No. IV, May 4, 1922, at page 1219.

sulphur. The last mentioned element was rather high but, partly because of the large proportion of molten iron used in the steel charges, this did no particular harm as sulphur is absorbed from the gas only by bare hot iron which is exposed to its direct contact as is the heaped-up scrap during the melting-down period. The small proportion of scrap in the charges kept this at an allowable minimum.

Gas Producer Troubles

The poor gas had been due to a number of causes. The bed of ashes which served as a grate was usually too shallow. The bed of burning coal was often too shallow also. As a result of these conditions the air from the central blast distributor was not properly spread over the whole fire and combustion was too rapid and, consequently, the degree of heat too high near the center. The ashes were thereby fused into clinkers, some of which were of prodigious size, extending over nearly the whole fire. The shallow fire allowed some of the air to pass through unburnt. The fire was too hot on top, a bright red, and the heavy hydrocarbons, tar and oil, heavier than methane or marsh gas (CH_4) distilled from the coal, were "cracked" or broken up chemically by the heat and partly burnt, so that the heating power of the gas was seriously diminished. Further, when the heavy hydrocarbons were decomposed much of the carbon was set free in the form of soot which settled in the necks of the producers and in the gas flues. This fact was one of the first I noticed, as the accumulation of soot in the producer necks had been so great that it had been the custom to open and clean them every Wednesday, a proceeding which was new to me and not needed with good running.

When producers are properly operated some of the tar distilled from the coal will be condensed on the pokers used to poke the fire and on the valves which close the peepholes above the fire. A glance at these tells much of how the producer is being run. At the plant in question no tar was visible; only dry soot on the tools and valves. After we began to improve the gas, the producer necks were opened but once on a Wednesday when, as no harmful amount of soot was found, there was no need to continue the practice.

When poor gas is being made and the producers are being blown moderately, if the blast pressure be increased there will be some addition to the quantity of gas which will, for a short time, give a longer flame in the furnace, but such increased pressure is merely a stimulant. Reaction soon follows and the gas becomes still poorer unless improved by better work at the producers. The high pressure of 50 lb. per sq. in. on the steam blast pipe, which was common, had been used in the effort of the furnacemen to get more heat into the furnaces. What was really needed was a smaller volume of richer gas.

Good producer gas made from bituminous coal has a yellowish color. It gives a tarry odor to the hand when held for a second or two in the stream flowing out of a pokehole, and such a stream when ignited will burn with a clear flame. Poor gas is bluish in color and sometimes will not burn as it flows out of a pokehole though it will in the hot furnace.

As soon as the gas was better the pressure on the blast pipe of the producers was kept about 25 lb., which with the producer fires in good shape was ample.

Soon after my arrival I remained one Saturday afternoon to see the gas flues burnt out and cleaned. The unfamiliarity of the men with the work showed me that it had been neglected and it was strange that more trouble had not arisen from the clogged-up gas flues. Burning out was regularly done on Saturdays thereafter.

Better Gas Practice

The various points mentioned which contributed to make the gas poor were corrected as they were recognized. Most of the men were quite intelligent, ready and willing to do good work when they knew what was wanted. In fact, lack of proper supervision had been largely responsible for the poor gas. There was no gas foreman, each furnaceman taking such gas as his two gas men furnished him, without much complaint. A few days' run showed me that that arrangement would not do, and with the acting superintendent I picked out the best man on each of the three shifts to act as foreman. The quality of the gas was usually good thereafter. The answer from better gas came at once and some heats were made in 11 hours within the next few days.

Frequent analyses of the gas aided to keep up the quality, the results being posted so that every one could see how well the gas men did their work. The board on which they were posted bore the statement that what was wanted was carbonic dioxide (CO_2), under 4 per cent and carbonic monoxide (CO) over 26 per cent. These requirements were often met. The analyses shown me when I first reached the plant, to prove that the trouble was not due to poor gas, had from 5 to 7 per cent of CO_2 and one would indeed have thought that such gas, though not good, would have been more efficient than it was.

We had some trouble in teaching the gas men to make clean ashes, that is, free from carbon or unburnt coal. Some of them were prone to take out ashes too freely, bringing some intermixed coke down below the combustion zone where it would not be burned but would remain in the ashes, being so much wasted fuel.

Still our coal consumption was low when the gas was good. For some single weeks the consumption was under 400 lb. per ton of ingots. Such a low figure was, of course, due to the high proportion of molten crude iron ("hot iron") used in the charges, which supplied heat, as well as to the shortened "time in furnace" as compared with former practice.

Silicon Content in Pig Iron

As previously stated, however, we were by no means out of the woods even with good gas. Better iron and better bricks were needed. Having no mixer, the iron had to be used as it came molten from the blast furnace; not a desirable course when the blast furnace practice has not become regular. A scarcity of scrap made it necessary to use from 75 to 85 per cent of crude iron in the charges, and with that high percentage the troubles from high silicon in the iron were intensified. If we had had a mixer and so had known the composition of the iron before charging it into the steel furnace it would have been a great help. We then could have proportioned the initial charges of ore and lime to the work they had to do; that is, to the quantity of silicon they had to oxidize and also to serve as base for the silicic acid, to the end that time would have been saved and excessive erosion of the furnace prevented. Having to assume (i. e. guess at) the percentage of silicon in the iron, we had to be on the safe side and add less ore than the probable amount required, lest the iron should have less silicon than anticipated and therefore be decarburized too rapidly by the ore not needed for oxidation of the silicon, and be too low in carbon when melted. When, as a rule, more ore was needed for decarburization, it had to be charged into the molten bath and sometimes several tons were required. The metal when all was melted had usually from 1 to 3 per cent of carbon. With regular iron of known silicon content, which would admit of closer oreing, it should not have had over 1 per cent. The iron was often charged into the steel furnace before its silicon was determined. Then the way it sparkled when poured gave some indication of what to expect. The lower the silicon the more sparks and the more brilliant sparks. When the iron had below 1.25 per cent of silicon, there were showers of scintillating sparks; if over 1.5 per cent the sparks were relatively few in number and when over 2 per cent of silicon was in the iron there were practically none.

Effects of High Silicon

When the silicon in the iron was unexpectedly high, that is, over 2 per cent, and more so when it was over 3 per cent and ore additions had not been increased proportionately, the cutting and erosion of the basic bottom was positively sickening. Great recesses were fluxed out, reaching sometimes back to the silica brick walls, the erosion of which added silica to the slag and large quantities of magnesite were required to replace the bottom losses. Then, too, the quantity of slag made was excessive and retarded unduly the passage

of heat to the metal and also slowed down the effect of the ore, lime and fluorspar added in working the charge. In rare instances the silicon in the iron ran over 4 per cent, though probably in no one charge did the crude iron average as high as that figure.

However, relief from excessively high silicon was at hand. By force of circumstances, the blast furnace tuyeres had to be shortened 3 in. on a side, which made the crucible in effect 6 in. larger in diameter. This change increased the output of the furnace from 400 to about 450 tons daily, and, what we appreciated far more, enabled iron having about 1.25 per cent of silicon to be made. The blast furnace ran warmer up along the boshes, as shown by the formation of steam on that part of the furnace where none had been seen before, an unforeseen consequence of the shortened tuyeres.

After having better gas, having lower silicon content in the crude iron was the second great condition leading to larger production and shorter time in furnace. As there was less room for danger of over-oreing on the low silicon side the amount of ore and lime charged first, before any of the metallic part of the charge went in, could be made to meet the actual requirement more closely, leaving less to be added later. When the charge was all melted there was but a moderate amount of carbon to be eliminated.

The ideal silicon content in the crude iron when it forms 80 per cent of the charge is about 0.8 per cent, so the iron we had containing 1.25 per cent was still too high in that element for the best working, but it was so much better than what we had before that it enabled us to make an important saving in the average "time in furnace" of the heats.

With the high silicon irons the slag was likely to "foam" in the furnace and in so doing to rise so that it reached the silica bricks above the basic hearth and erode them. To prevent this, we cut down the heats in weight when the iron had high silicon.

With silicon under 2 per cent heats were 65 tons.

With silicon from 2 to 2½ per cent heats were 60 tons.

With silicon over 2½ per cent heats were 55 tons.

This helped a little to preserve the brick work of the furnaces. When the slag foamed it was necessary to bank up the furnace doors to prevent it running out on the charging platform.

At one steel plant in this country, I was told after my return, in three months their blast furnaces had not made any basic iron with over 1 per cent of silicon and practically all their iron had between 0.7 and 0.9 per cent. This was from the steel man who used the iron and not from the blast furnaceman who made it. With iron of such uniform composition, a mixer is not needed except as a reservoir to assure a supply of molten iron when it is wanted.

Bricks

The silica bricks of which the furnaces were built would not stand well a good melting heat, which was one reason why better gas had not been demanded. The gap in temperature between a proper degree for the bath and danger to the roof, never too great, was cut down to extremely narrow limits. It was partly from effort to preserve the roof that so many of the heats had been cast too cold and as a consequence that the great quantities of pit scrap and ladle skulls referred to were made. The bricks failed by pieces dropping off from them when the hearth became too hot. Good silica bricks when they do fail do so by fusion, the melted material streaming down like excessively thick molasses. To see if I could suggest anything to help the brick makers I went to their works, though I had never been in a silica brick factory. I also visited the quarry where they obtained their silica rock, a Devonian quartzite, which looked like the Dinas rock of Wales, which might be called the standard for silica brick making. The only suspicious thing about the silica rock was the presence of 0.3 to 0.4 per cent of alkalies reported by the chemist, and to that I was at first inclined to ascribe the inferior heat-resisting ability of the bricks. Since then I have seen good silica bricks made and am satisfied that the poor quality of those in question was due to inadequate grinding and mixing of the quartz and lime in the Chilian (edgestone) mills in which that operation was carried on. When the grinding and mixing is insufficient the mixture of lime and fine silica, which forms the cementing material between the pieces of quartzite, has too little silica and hence a high proportion of lime, and in consequence a relatively low fusion point. Then when a brick made of such imperfectly mixed ingredients is heated to the fusion point of its cementing material, the latter loses its strength and allows pieces of the brick to drop off. With further grinding and mixing the cementing material would take up more and more finely crushed silica and approximate closer and closer to the composition and therefore the refractoriness of the quartz itself. Hence the importance of sufficient grinding.

Before I reached the place the inferior heat-resisting power of the bricks had been recognized and a supply of roof bricks of proven quality had been ordered elsewhere. The full realization of our expectations had to be delayed until those bricks reached us. When that happened the central part of each furnace roof where the heat was most intense was made of the new bricks and we were masters of the situation and melted our heats at a fair rate. The steel scrap in the furnace, in melting and running down the sides of the still solid metal mass above the bath, would give off sparks and scintillations which showed that it still contained some carbon which in being oxidized to gas caused the sparks. With good quick melting that is the usual thing; but if melting is slow, as it had been before the new bricks arrived, the successive layers of the agglomerated melting scrap are decarbonized before they are melted, if not indeed partially oxidized, and the molten material flows down quietly without sputtering, as it should.

One heat was made in 8 hours and 20 minutes. Bonuses for output came into force and something like satisfaction pervaded the plant.

Yield Goes Up

One great benefit from faster driving and proper hearth temperatures came from increased yield and higher percentage of ingots. Instead of less than 85 per cent of ingots, figured on the metallic part of the charge, and not including the iron in the ore the yield went up to 95 then 97 and finally over 99 per cent average of ingots for a week. Theorctically we should have had several per cent more if all the silicon, manganese, phosphorus and carbon in the crude iron had been utilized in reducing iron from its ore, but of course that could not be realized, though we did have single heats which yielded over 101 per cent of ingots. Pit and ladle scrap also became small and almost negligible in amount. The effect of high yield in lowering costs is very marked.

Skin Holes

Increase of production was the reason for my presence at the works and nothing was said to me about quality, as no trouble on that score had been encountered in making rails, machinery steel and structural steel, including beams and channels. The failure of a rail in the drop test was a rare event and the other products were marketed without complaint. Near the end of my sojourn, however, the manager guardedly sounded me on the question of seams in some rounds rolled for the manufacture of 3-in. projectiles for field artillery. Long after I heard that some of the steel had been rejected because of seams. I explained to him that these seams, which are exposed near the outer surface in machining, are caused by gas (probably hydrogen), which forms skin holes close to the outer skin of the ingot, which holes are coated inside with scale (oxide) formed in the heating furnace before rolling. The rolling operation draws them out into long seams in the rolled bloom, billet or bar, as they cannot be welded even if the steel is hot enough, because of the oxide of iron in them. These skin holes are elongated gas holes and in simple steels having about 0.5 per cent of carbon are usually between 1/16 in. and ⅛ in. across and from ½ in. to 1 in. deep. They are located with their axes perpendicular to the mold wall or ingot surface, their outer ends being close to the surface and covered by a thin skin of metal which is likely to be burnt through in heating the ingot

for rolling. In number these holes vary according to the degree of completeness with which the gases, or to speak more particularly, probably the hydrogen, is kept in solution in the metal while it is freezing. In a mild case there may be one to every 3 or 4 sq. in., while in a bad case there may be ten times as many or even more. They are more numerous the nearer to the top of the ingot. In moderate cases the bottom of the ingot is comparatively free from them while the upper half has many.

To explain the matter I took the manager to the ingot yard where were some ingots that had been heated for rolling and then drawn from the furnace, piled in the yard and cooled, when, because of some trouble at the mill, they could not be rolled. These ingots had scale on them about ⅛ in. thick, due chiefly to poor producer gas with which the furnace was served, worse than the poorest which had been made at the steel plant. This scale, which was thicker than it should have been, represented about 1/16 in. thickness of steel. It was easily knocked off and revealed the skin holes whose depth could easily be sounded with a pin. Inspection of rolled billets showed the seams into which rolling had transformed them, particularly on the end, where the shear knife had distorted the metal and so opened them up.

Aluminum as a Preventive

The next question was how to prevent these skin holes in the ingots. The steel had about 0.15 per cent of silicon, which was nearly enough for the purpose, and aluminum had been freely but not intelligently added, so that some steel was full-piping and had therefore no skin holes, while other ingots had. The aluminum was in the coarsely granulated form commonly used for additions to steel. I had made a little tin scoop which would hold 3 oz. of this granulated aluminum, or 1 oz. per ton in a 3-ton ingot—an important amount.

To make steel of munition grade free from skin holes it has to be piping to a certain extent, though not necessarily wholly killed. It must not rise at all in the mold. The proper moderate rate of settling can soon be learned by the steel pourers. I instructed them to put 1 oz. of aluminum per ton into the first mold teemed and from the behavior of the steel there to increase or diminish the dose in the subsequently poured molds according as the steel already teemed rose in any degree in freezing or settled unduly. The amount of aluminum required was rarely less than ½ oz. or more than 2 oz. per ton. Two or three times as much could have been added if needed without detriment to the steel. When 1 oz. was used it was added when the mold was half full of steel. If 2 oz., half of it was added when the mold was one-third full and the other half when it was two-thirds full, and so forth.

To demonstrate the efficacy of the method, I treated one ingot of a heat, No. 9 as cast, with the proper dose of aluminum, and left the next one, No. 10, without it. These two ingots went into the heating furnace hot with the rest of the heat, but were not rolled. When their turn came to be drawn from the heating furnace, they were taken out and laid on the mill floor to cool. The next day, when cold, the scale was knocked off, when the treated ingot was seen to be free from skin holes, while the other had them. The practice was successfully followed with large quantities of munition steel thereafter. The ingots cast later from each heat required less aluminum than those cast earlier, sometimes not more than half as much for the last few ingots of a heat as for the first. It is the rule that the latter part of a heat to be cast rolls better and is better than the first, showing the advantage of allowing ample time to elapse, after the final additions are made, for the steel to clean itself.

It may be stated that as a rule the steel rolled unusually well in the blooming mill, few cracks being opened up in any ingot and such as did were obliterated in a few more passes through the rolls. Some ingots showed no cracks at all when rolled. The blooming mill superintendent said that our steel rolled better than any he had ever rolled before and that it stood a good heat.

The method of making steel was not unusual, but may be briefly stated. The ore and lime were charged first, then the scrap, 15 or 20 per cent of the charge, and when all was at least red hot molten iron from the blast furnace in 30-ton ladles to make up the charge of 65 tons was poured in in the usual manner through one of the front doors of the furnace. After all was melted tests (samples) were taken, broken and judged. According to the excess of carbon still present, which had to be eliminated, further additions of ore were made. When the percentage of carbon and bath temperature were right, the ferromanganese was thrown into the bath and the furnace tapped in a few minutes thereafter. This way of adding the manganese wastes more of it than when it is thrown into the ladle, but makes better steel. A failure of a rail in the unusually severe drop test was a rare occurrence. Later at the same plant manganese was added in the ladle in the form of molten 30-per-cent spiegel and the failures in the drop test ran up to about 10 per cent. Ferrosilicon when used to give silicon to the metal was added in the ladle.

The crude iron and pig iron ran about 1 per cent in manganese, 0.15 per cent in phosphorus and 0.03 per cent in sulphur, the silicon being as already stated.

Four typical heats of structural steel analyzed as follows in percentages:

No.	Carbon	Manganese	Silicon	Sulphur	Phosphorus
0	0.29	0.57	0.037	0.030	0.013
3	0.28	0.65	0.047	0.033	0.042
5	0.39	0.55	0.037	0.026	0.010
7	0.24	0.57	0.020	0.032	0.010

The slags from these heats analyzed:

No.	SiO_2	FeO	Fe_2O_3	Al_2O_3	MnO	CaO	MgO	P_2O_5	S
0	18.6	7.7	2.5	3.5	2.2	55.6	4.3	2.6	0.12
3	24.8	6.2	3.3	3.6	4.2	44.0	9.5	2.1	0.08
5	16.7	11.0	2.5	4.8	2.1	53.8	4.9	2.0	0.13
7	24.4	7.5	2.1	4.2	10.6	42.0	7.6	1.7	0.10

These slag samples were taken just before the addition of manganese before tapping. The high silica, 24.8 per cent, in slag No. 3, accounts for the relatively high phosphorus, 0.042 per cent, in the steel, showing that the silica was above the allowable maximum. No. 7 steel was freer of phosphorus than would have been expected with the high silica in the slag, 24.4 per cent, which indicates that probably some silica got into the slag after dephosphorization was far advanced, when the slag could hold phosphoric acid, though it could not, because of the high silica, have taken up much more.

Similar steels rolled into 7-in. channels gave the following properties in the tensile test:

Elastic limit ..... 44,800 lb. per sq. in.
Tensile strength ..... 70,570 lb. per sq. in.
Elongation ..... 28 per cent in 8 in.
Contraction of area ..... 43 per cent

The ductility is extremely good.

Manganiferous Ore

In one part of the company's ore deposit was iron ore carrying from 6 to 15 per cent of manganese, and the manager asked me one day what use could be made of it as it was too rich in manganese to use in the blast furnace. I suggested that some be sent to us for use in the steel furnaces to work the charges and in due course a lot of this ore arrived. It was the finest thing in that line I ever saw. It was in lumps of from 5 to 75 lb. weight, just the right size for working the bath. A fresh fracture showed a black, amorphous, wax-like structure with nothing earthy about it. The silica varied between 2 and 3 per cent, the remainder of the ore being substantially pure oxides of iron and manganese.

The use of this ore in the steel furnace to oxidize the non-ferrous elements was most advantageous, as any steel melter will understand. First, it gave high manganese in the slag. This within limits, is beneficial because it lowers the fusion temperature, which is especially important when the slag has an unusually high percentage of lime. Second, considerable of the manganese in the ore got into the metal. The iron

and the iron ore previously used contained some manganese and we had found that, as usual, the metal of the bath took up some of that element during the decarburizing stage, being reduced from the slag, together with some iron, by the carbon. But with the high manganese ore that feature was accentuated. The heats, worked with that ore, ordinarily had about 0.2 per cent of manganese when first melted and then gained during decarburization an equal amount or more from the slag, raising the manganese content to 0.4, sometimes 0.5, and in one heat to 0.6 per cent before the final additions. With this content of manganese the metal contained no important quantities of oxides or other non-metallic impurities, required smaller final additions of manganese, rolled unusually well and had high physical properties. Third, sulphur was eliminated from the metal in an important degree by the high manganese. All these effects tended to improve the quality of the steel both in rolling and when tested cold.

Ladle Troubles

Trouble from leaky stoppers in the ladle called attention to them and I made five changes in them which with some instruction to the ladlemen prevented most of such trouble thereafter. 1. The goose-necks which held the stopper rods were too long because of an error in the drawing, so that the stopper rods would not stand vertically. New goose-necks of the proper length were made. 2. The adjusting screw for swinging the stopper rod in and out was too long, due also to an error in the drawing, so that the rod could not be properly adjusted. The screws were cut off to the proper length. 3. The washers used under the nuts which clamped the stopper rods to the goose-necks were but ⅛ in. thick, which was too weak and flimsy, and sometimes the stopper rods became loose and therefore failed to shut off properly. Washers ½ in. thick were made to replace the thin ones and the rods were then securely held. When the rods were not vertical the difficulty of holding them was of course greater. 4. Steel continued to run after slag appeared in the stream from the ladle nozzle, which indicated that the bottom of the ladle inside did not have a proper slope toward the nozzle. It was given a slope of 6 in. 5. The cup formed around the nozzle inside the ladle was too small in diameter and too deep, so that some of the steel was liable to freeze there and make the stopper hard to open. The cup was cut down and widened out on the side toward the center of the ladle to allow the steel to circulate better while the charge was running into the ladle and so to prevent chilling. It also helped to make the steel drain out better at the end of teeming. The other side of the cup was not changed. That part acts as a guide to direct the stopper to the nozzle when the ladle is not full. When it is full the heavier steel tends to float up and so to lift the stopper rod and spring it away from the side of the cup. This spring should be allowed for by having the stopper set so that the stopper will bear against the side of the cup away from the ladle center when the ladle is empty.

Some of the men mildly resented being told anything about their art and refused to follow instructions, but in such cases I did the things myself, and as I got results they were bound to beat me if possible. When they did so I freely gave them credit for it. Having stayed longer than I had intended, because of waiting for the foreign bricks, though not as long as the manager had anticipated, I left them comparatively happy and doing a profitable business. No radical changes had been made in the plant or appliances and no one had been discharged, though one of the gas men quit of his own accord when he found that he would be required to make better gas.

Plate Mill Built for Homecourt Works

The United Engineering & Foundry Co., Pittsburgh, has completed a 48-in. universal plate mill as part of a contract for heavy machinery for the Homecourt works of the Cie. des Forges et Acieries de la Marine et d'Homecourt, France. The mill embodies refinements and improvements now applied for the first time. It is designed to plates 11 to 48 in. wide and from No. 12 gage to 2 in. thick, and sheared plates 84 in. wide.

The mill is of the two-high reversing type with four vertical rolls, two on each side. It is in reality a combination slabbing mill, a universal plate mill, a two-high sheared plate mill or a blooming mill. The bottom roll has a definite elevation and the top roll has a maximum lift of 24 in. The vertical rolls have a range from 11 in. to 48 in. wide. The horizontal rolls are 34 x 100 in. and the vertical rolls are 24 in. in diameter.

Heretofore, the company claims, the bevel or miter gears driving the vertical rolls of universal mills were designed too small, and the vertical rolls with their gears and driving shafts were hard to dismantle, making roll changing awkward, time-consuming and expensive. In the new mill, the main bevel gear shafts are 15 in. in diameter with the keys forged integral with the shafts. The bevel gears are 46 in. in pitch diameter with 12-in. face and have a bearing on the shaft of 45 in. long.

For the rapid changing of rolls, the horizontal rolls are passed through ample housing windows, and in the case of the vertical rolls, the bevel gear shafts are lifted out, the caps securing the vertical roll housing top guide shaft are then removed and both vertical rolls with their housings, bearings, etc., are lifted out as a unit.

Spare vertical roll housings are furnished with the mill so that spare vertical rolls can be fitted on the floor and the unit assembled ready to be lifted into place. When it is used as a sheared plate mill, the vertical rolls being removed, feed rollers dropped into place fill up the gap between the mill tables and the horizontal rolls. To protect the housings, guard plates are provided. The relation of vertical rolls to horizontal rolls provides for a minimum length of slab or ingot of about 30 in.

The two motors operating the screwdown of the horizontal rolls are mounted on a removable motor base. By removing several keys and making one hitch with a crane, the top of the mill is cleared. The motors for operating the screws for traversing the vertical rolls are located on either side of the spindles between the pinion and roll stands.

The spindles are fitted with the United engineering universal couplings. The pinion housing is bolted directly to the foundation. The pitch diameter of the main pinions is 36 in., while those for driving the vertical rolls are 34 in.

New Rolling Mill Equipment

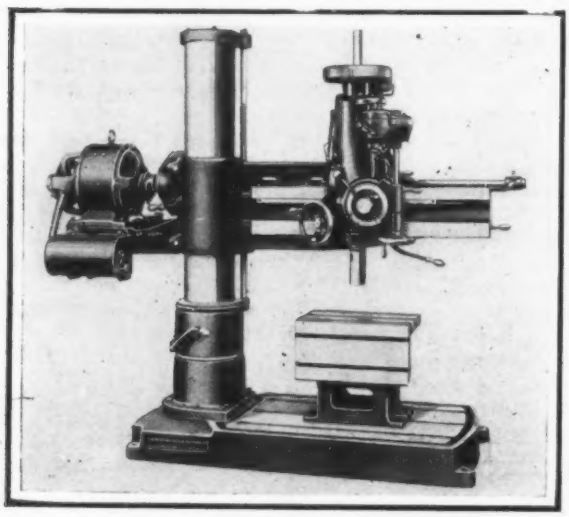
The Mesta Machine Co., Pittsburgh, has recently received some large contracts and is operating its plants at Mesta, near Pittsburgh, to practically full capacity. The orders include one from the John A. Roebling's Sons Co. for a 56-in. x 48-in. Mesta una-flow type engine (Stumpf patents) employing a rope drive; also one from another company for a 44-in. x 48-in. una-flow type engine with a double helical cut tooth gear drive for sheet mills. For the Newton Steel Co., Newton Falls, Ohio, the company will furnish a 2000 hp. double helical cut tooth gear drive, this being a duplicate of a Mesta drive furnished some time ago. A pickling machine has just been shipped to a mill in Belgium to be used for pickling tubes, and another to Japan for pickling sheets for galvanizing. Two similar machines of large size have just been built by the Mesta company for a large domestic maker of sheets and tin plate. The Central Steel Co., Massillon, Ohio, has contracted for a No. 4 motor-driven enclosed headstock roll lathe, and the Trumbull Steel Co., Warren, Ohio, for three open-throat bar shears. A similar shear goes to the Connors Steel Co. The Mesta company is building for the Sparrows Point, Md., plant of the Bethlehem Steel Co. a 24-in. edging mill, and has furnished considerable auxiliary equipment to the Midland, Pa., plant of the Pittsburgh Crucible Steel Co.

Radial Drill with Motor on the Arm

A radial drill with the motor mounted on the back of the arm as shown in the illustration is being marketed by the Morris Machine Tool Co., Cincinnati.

In this design the lower shaft, bevel gears and shaft in the column gears in the column cap, the outside vertical column shaft and the bevel gears in back of the arm are eliminated, which, it is claimed, results in a power saving of 20 to 25 per cent, there being also just that much less mechanism to wear or get out of order. An additional advantage claimed for this arrangement is that it balances the arm, permitting that member to raise and lower on the column without undue strain on the arm-raising and lowering mechanism.

An important feature is that the arm-raising and lowering mechanism is mounted as a unit on the back of the arm near the motor-drive gears, and is only in



The Motor Mounted as Shown Eliminates Several Gears and Shafts

operation when the arm is being raised and lowered. For this reason, it is emphasized, this mechanism was removed from the column cap, as this meant the constant running of a pair of bevel gears, a vertical shaft in back of the column and a few gears on the column cap as long as the machine is running, or the mounting of an extra motor to raise and lower the arm. In this design the screw is stationary. The revolving unit is of bronze and mounted on a ball-thrust bearing large enough to carry considerably more than the weight of the arm, head, motor and other details. A safety mechanism is provided to disengage the clutch that operates the arm-raising and lowering mechanism at the extreme positions of the arm.

The machine shown is a 4 and 4½ ft. radial, a 3½ hp. motor being used. The controller is mounted below the motor within easy reach of the operator. The head has the same features other styles of the company's radials which include the tapping attachment running in oil, back gears and clutches of nickel steel, heat treated and hardened, helical spindle gears, and all bronze bearings with oil chamber. Spindle speeds are from 26 to 450 r.p.m.

More Metal Workers at Higher Wages

Iron and steel plants, according to figures of the Bureau of Labor Statistics, show for May a gain over April of 3984 employees in 103 establishments. This gain of 3.2 per cent was accompanied by a gain of 8 per cent in amount of payroll and a corresponding gain in the average pay envelope from $44.29 to $46.30, or 4.5 per cent.

In the automobile industry the gain in 44 establishments was 9.7 per cent in number of employees and 14 per cent in payroll total. In car building and repairing there was a gain of 4 per cent in number of employees in 62 establishments, and a gain of 4.8 per cent in amount of payroll.

Metal workers as a whole, represented by these three groups, show a gain of 15,099 employees (5.55 per cent) during the month, accompanied by a gain of 9.8 per cent in total payroll. The average pay envelope advanced from $55.94 to $58.20, but it is still far below the $62.28 of last year.

Wages in car building and repairing, due to the continuance of war time wages in railroad repair shops, are considerably higher than in the steel industry. The excess in May over steel mill wages was 24.9 per cent. Wages in automobile plants, which are exceptionally busy, were 59 per cent over those prevailing in steel plants. Details are shown in the table.

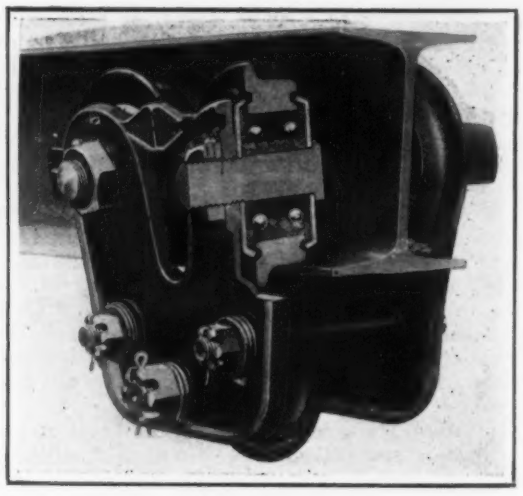
Period	Number of Establishments	Number of Men	Half-Month Payroll	Average Pay Envelope
Iron and Steel				
April, 1922.....	103	122,881	$5,441,544	$44.29
May, 1922.....	103	126,865	5,874,369	46.30
May, 1921.....	106	115,709	5,869,704	50.82
*Automobiles**				
April, 1922.....	44	90,592	6,416,780	70.83
May, 1922.....	44	99,389	7,315,616	73.60
May, 1921.....	45	92,649	6,907,496	74.56
Car Building and Repairing				
April, 1922.....	62	58,302	3,344,004	57.36
May, 1922.....	62	60,620	3,505,492	57.83
May, 1921.....	62	49,111	3,256,501	66.31
Total Metal Workers				
April, 1922.....	209	271,775	15,202,328	55.94
May, 1922.....	209	286,874	16,695,477	58.20
May, 1921.....	213	257,469	16,033,701	62.28

*Payroll figures are reported as "weekly"; they have been made "half-monthly" by multiplying by 2 1/6.

New I-Beam Trolley

An I-beam trolley constructed as shown in the illustration, known as the Whale, has been brought out by the Richard-Wilcox Mfg. Co., Aurora, Ill.

Each trolley has eight sets of high-duty ball bearings intended to reduce friction to a minimum and to overcome excessive radial thrust. Felt washers are provided to exclude dust from the bearings and also act as a conductor for the lubricating oil. Other features include a short wheel base providing easy operation on curves, and bumpers to protect the wheels from



Wheel Treads Are Crowned to Reduce Friction

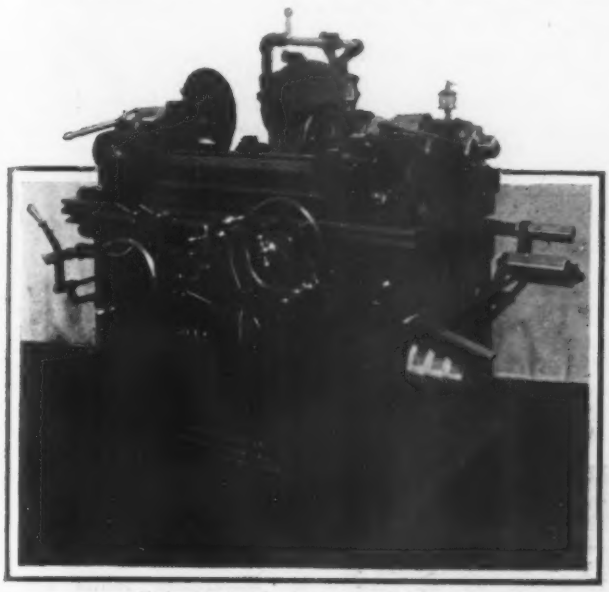
shock when trolleys run together or strike the stop at the end of the track. Wheel treads are crowned to give minimum friction and are chilled to give utmost hardness. The spreader bolts are designed to permit equalizing action when the trolley operates on curves or uneven track. The spreader rods are set in slotted holes so that the trolley is hinged from the load pin, assuring even distribution of the load on all four wheels and under all conditions.

The wheels are die cast, resulting in smooth and hardened treads. The crowned wheel treads and short wheel base permit a fully loaded trolley to be easily pushed around a short radius curve track with minimum resistance, a 1-ton trolley fully loaded being pushed along the track requiring an effort of only 30 lb., it is claimed. The trolley has a factor of safety of 5 to 1, which is intended to prevent injury in case of accidental overloading.

Plain Cylindrical Grinding Machine

The Norton Co., Worcester, has added to its line the 10 by 18 in. plain cylindrical grinder shown in the accompanying illustration. The new machine incorporates the productive capacity established by the company's 10 in. machines, but at the same time is designed to be economical of floor space through the shortened capacity between centers. It will accommodate a large group of parts that are ground, particularly those produced by automobile and accessory makers.

The specifications include the following dimensions: The headstock spindle is 2⅝ in. in diameter and the



Plain Cylindrical Grinding Machine

diameter of the center 1⅝ in.; the dimensions of the same member of the footstock being 2¼ in. and 1½ in., respectively. The length of both the headstock and the footstock bearing on the swivel table is 14¼ in. The weights of the headstock and footstock are approximately 150 lb. and 80 lb. respectively. The weight of the wheel-slide is approximately 735 lbs., the same complete with spindle and wheel guard being about 925 lb. The length of bearing ways is 24½ in.

The wheel spindle is of heat-treated alloy steel and is 28¾ in. long, over all, the large bearings being 3½ in. in diameter, 8 in. long and the small bearing 2 in. in diameter and 6 in. long. The standard grinding wheel is 18 in. in diameter, the largest wheel allowable, with special guard, being 20 in. The maximum size of work possible with the standard wheel, not always advisable, is 10 in.

Equipped with a 10 by 50 in. or larger table speed frame, the range of table speed is from 17 to 158 in. per min., with eight steps on the cone. With a 10 by 36 in. speed frame, the speed is from 21 to 126 in. per min., with four steps on the cone. A 40 gal. water tank is provided.

A 3-ton Heroult electric steel making furnace is to be built for Renton & Fisher, Ltd., of the Hopetown Steel Works, Bathgate, Scotland, by the Volta Mfg. Co., Ltd., Welland, Ont. Transformer and switchboard equipment are included.

The annual summer outing of the Pittsburgh Foundrymen's Association will be held in Turner Park, Perrysville, Pa., Monday, June 26.

Continuous Milling Machine

The accompanying illustrations show a new continuous milling machine, designated as the No. 782, of the Newton Machine Tool Works, Inc., Philadelphia. One of the views displays the machine equipped with a tub for the cutter coolant, and the other, the machine without the tub, bringing out clearly the arrangement of the controlling dogs used on the intermittent motion.

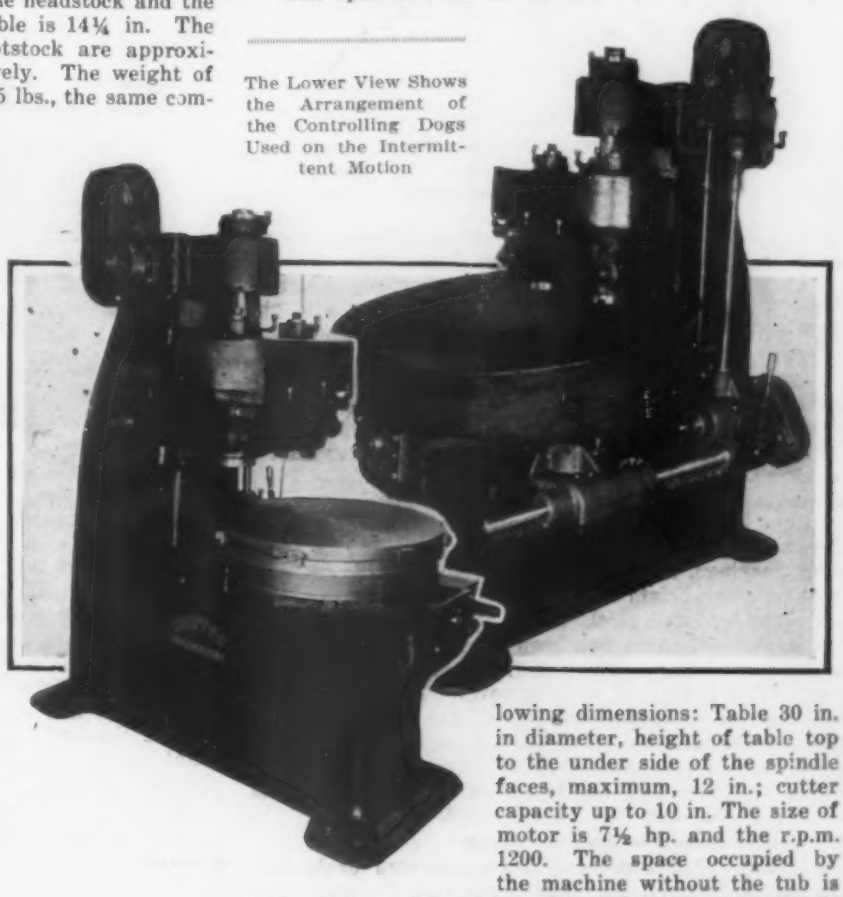
The table has two separate types of feed motion. The first is continuous for straight continuous milling and the second intermittent feed and rapid traverse, in which the rapid traverse is at a ratio of 10 2/3 times the feed for limited quantities, or where the surface to be machined is less in area than the casting itself.

The table is of the solid-top type. It has two bearings, one an annular bearing so that the table only overhangs the saddle ⅝ of an inch, eliminating twisting or buckling. The table is rotated by a helical gear fully inclosed, which together with the table bearings, runs in oil. The pinion operating the table and helical gear is rotated by a large diameter worm and worm wheel, this combination of gearing being intended to prevent back lash.

The feed motion is supplied with a lever for disengagement, and with a safety clutch of the over-running type to prevent breakage in the event of overloading or jamming the machine. The table feeds are varied through the use of pick-off change gear. The table saddle is adjustable on the base, which permits positioning the table in relation to the cutters.

The spindles are of taper-end construction, with face keyway, Morse taper hole and draw-in bolt. They are driven by hardened steel gears and supported between bearings fully inclosed to run in oil. The sleeve in which the spindle is confined provides an individual end adjustment for setting cutters of 2 in., having of course provision for clamping after it is located. The motor is mounted on top of the machine, driving through pick-off change gears to provide variation in the spindle speeds.

The specifications of the machine include the following dimensions: Table 30 in. in diameter, height of table top to the under side of the spindle faces, maximum, 12 in.; cutter capacity up to 10 in. The size of motor is 7½ hp. and the r.p.m. 1200. The space occupied by the machine without the tub is 74 by 38 in. and by the machine with the tub 81 by 54 in. The height overall, including motor, is 8 ft. The distance from center of the spindles to the upright is 10 in., and the distance between spindle centers, 13 in.



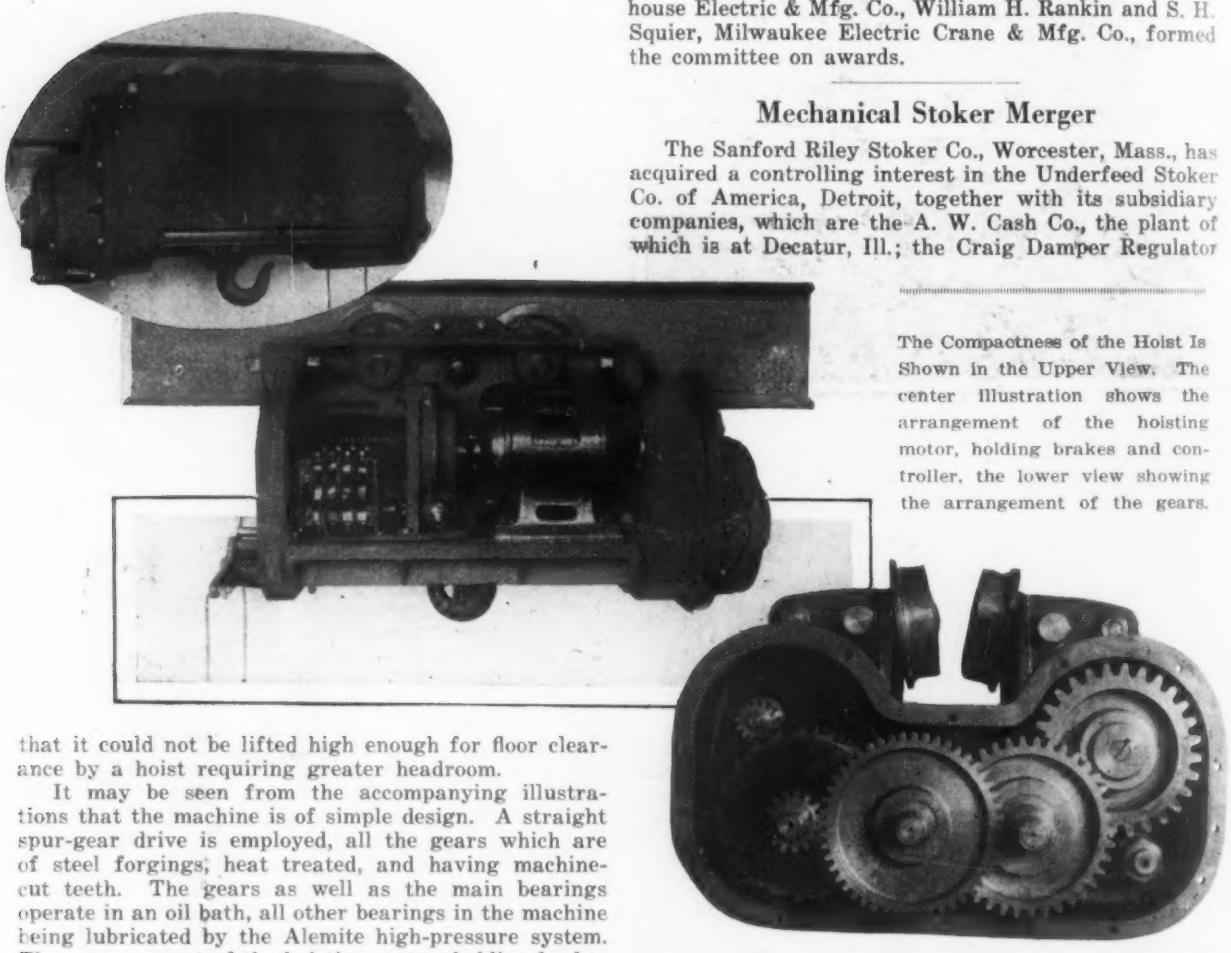
The Lower View Shows the Arrangement of the Controlling Dogs Used on the Intermittent Motion

NEW ELECTRIC HOIST

Unusually Short Head-Room the Principal Feature—Mechanism Accessible—Automatic Lubrication

A new electric hoist having unusually short headroom, 9 to 14 in., as its principal feature, has been brought out by the Standard Electric Crane & Hoist Co., Philadelphia. In this design an effective working head-room of 14 in. on the 3-ton capacity hoist has been obtained, this being, it is pointed out 30 to 50 in. less than the usual electric hoist and about 50 per cent less than standard hand chain hoists.

It is obvious that this feature is an advantage in a room with a low ceiling or in a room where a certain headroom must be maintained in the interests of safety. The hoist can be employed to advantage also where the material to be handled is of such dimensions that it could not be lifted high enough for floor clearance by a hoist requiring greater headroom.



The Compactness of the Hoist Is Shown in the Upper View. The center illustration shows the arrangement of the hoisting motor, holding brakes and controller, the lower view showing the arrangement of the gears.

It may be seen from the accompanying illustrations that the machine is of simple design. A straight spur-gear drive is employed, all the gears which are of steel forgings, heat treated, and having machine-cut teeth. The gears as well as the main bearings operate in an oil bath, all other bearings in the machine being lubricated by the Alemite high-pressure system. The arrangement of the hoisting motor, holding brakes and controller is shown in the illustration of the hoist with the cover removed, and will be of special interest perhaps to the maintenance and electrical engineers. The machine is equipped throughout with Hyatt high-duty bearings, and a machine efficiency of over 80 per cent on stock hoists is claimed. Track wheel pins are of manganese axle steel.

Special attention has been given to provide maximum accessibility. The outside covers can be readily removed, exposing all working parts, which in turn may be removed without disassembling the main frame or body of the machine. The hoist is entirely inclosed to make it dust and weather proof. The design embodies safety features and the factor of safety provided is said to be at least five, at full load.

I. B. Williams & Sons, manufacturers of leather belting, Dover, N. H., have announced the establishment of a new department of their business for the manufacture of mill strapping. T. L. Chapman, who was for many years New England manager for the Deford Co., and who conducted their mill strapping department, will have charge of the new department.

Industrial Advertisers' Association Elects Officers

At the convention of the Associated Advertising Clubs of the World, held at Milwaukee, June 12 to 16, the Industrial Advertisers' Association voted to join the major organization with 150 charter members. As a branch of the larger association, the smaller organization elected officers and prepared a program for the next convention. Keith J. Evans, advertising manager, Joseph T. Ryerson & Son, Chicago, was elected president; A. K. Birch, Allis Chalmers Mfg. Co., Milwaukee, treasurer; P. C. Gunion, Hyatt Roller Bearing Co., New York, vice-president, and H. N. Baum, Celite Products Co., Chicago, secretary.

The Chain Belt Co., Milwaukee, won first prize for the best industrial advertisement appearing last year at the conclusion of the industrial section meeting of the advertising convention. J. C. McQuiston, Westinghouse Electric & Mfg. Co., William H. Rankin and S. H. Squier, Milwaukee Electric Crane & Mfg. Co., formed the committee on awards.

Mechanical Stoker Merger

The Sanford Riley Stoker Co., Worcester, Mass., has acquired a controlling interest in the Underfeed Stoker Co. of America, Detroit, together with its subsidiary companies, which are the A. W. Cash Co., the plant of which is at Decatur, Ill.; the Craig Damper Regulator Co., Detroit; the Underfeed Stoker Co. of Canada, Ltd.; the Craig Damper Regulator Co. of Canada, Ltd., and the A. W. Cash Co. of Canada, Ltd. The Underfeed Stoker Co. has an authorized capital of $1,000,000 and is the oldest of the manufacturers of underfeed stokers for power boilers. Its control has been held at Toronto. R. Sanford Riley, president Riley Stoker Co., becomes president of the acquired corporations, and the headquarters of the combined business will be in Worcester. S. A. Armstrong, Detroit, will continue as managing director and vice-president.

The Sanford Riley Stoker Co. already owned the plant and business of the Murphy Iron Works, Detroit, and the product of the Underfeed Stoker Co. will be built there. It consists of a varied line of stokers, which, combined with the machines of the Riley company, make up a complete line of mechanical stoking apparatus. The A. W. Cash Co. manufactures valves and valve specialties, also the Craig damper regulator.

Cost of living May 15, according to the National Industrial Conference Board, was 54.9 per cent above 1914.

Foundrymen's Meeting at Rochester

Notable Sessions on Aluminum Products and Molding Sand Research—Industrial Relations Discussed

BESIDES the various technical meetings of the annual convention of the American Foundrymen's Association covering gray iron, steel and malleable castings reported in THE IRON AGE of June 15, there were also group sessions on non-ferrous topics, industrial relations and a highly important session on molding sand research. A report on these sessions, crowded out last week, is now possible.

For the first time one of the four non-ferrous sessions was devoted solely to aluminum and some of its alloys; at other sessions brass problems were prominent.

Also for the first time on a comprehensive scale an entire session was devoted to molding sand, and there was the usual session on industrial relations, somewhat abridged from that at Columbus.

Important Session on Aluminum Foundry Problems

RECOGNIZING the growing importance of the aluminum industry, one non-ferrous session was devoted exclusively to the discussion of aluminum topics. During this session, R. J. Anderson, Bureau of Mines, Pittsburgh, who presided, stated that there is need of more aluminum investigation along actual foundry lines and suggested that an aluminum session be held every year. He declared that the aluminum and the aluminum alloy metallurgy have been largely neglected by technical societies. He expressed himself in favor of a nomenclature for aluminum alloys, objecting to calling an aluminum alloy "aluminum," and declaring the system of numbering aluminum alloys unsatisfactory.

H. B. Swan, Cadillac Motor Car Co., Detroit, pointed out that the foundryman tries many things and finally stops a certain trouble, but keeps no record and does not really know what proved the successful remedy. Among other things which he said should be studied was the problem of getting more life out of pots as the cost of pots runs up high and that there are other problems coming up every day that should be investigated. A suggestion was made that the American Society for Testing Materials might aid in this work. Mr. Anderson stated that he is in receipt of around 50 inquiries per week from small foundries regarding aluminum problems which he thought had been settled, and an aluminum session could act as a clearing house for information. The sentiment appeared favorable to holding an aluminum meeting and Mr. Anderson volunteered to arrange a program of papers for the meeting next year. The program included five papers.

Melting Furnaces for Aluminum and Alloys

Robert J. Anderson presented a paper on "Aluminum and Aluminum Alloy Melting Furnaces." The author reviewed the work undertaken by the U. S. Bureau of Mines to decrease metal and fuel losses in melting aluminum and its light alloys. He said that if the present net losses could be reduced 50 per cent, a saving of $1,500,000 per year would accrue. He pointed out that the selections of the correct type of furnaces for a given set of operating conditions is difficult because of the many different types of furnaces available, and more particularly because of the lack of comparative data regarding each one. All the types of furnaces used in the United States for rolling mill practice, foundry practice, die castings and permanent molding practice and for smelting and refining were mentioned in the paper. In conclusion the factors governing the selection and operation of furnaces were outlined and information regarding melting temperature was presented.

Mr. Anderson stated that the bulk of light aluminum alloys are probably melted in stationary iron pot furnaces, the type of furnace employed depending largely on the personal choice of the foundryman. Large span flame furnaces are used in a number of foundries, but electric furnaces are used very little for melting aluminum. Aluminum alloys are still melted in the usual type of brass pit furnaces, particularly in foundries devoted to brass and bronze. Stationary crucible furnaces are used to a considerable extent for melting light aluminum alloys, and tilting crucible furnaces are used to a small extent. Tilting iron pot furnaces are also used some. Open flame furnaces are favored by some foundrymen principally because of their rapidity in melting. Reverberatory furnaces are used to some extent, but chiefly for melting aluminum for castings into rolling ingots.

V. Skillman, General Aluminum & Brass Mfg. Co., Detroit, in the discussion, said he did not believe there is a good furnace for melting aluminum at the present time and wanted to know what really is the best type to use. Mr. Anderson suggested the iron pot furnace for small foundries and an open-flame furnace like the Schwartz for a large output. One foundryman said that he used crucibles in place of iron pot furnaces and found them to be much better, getting from 50 to 60 heats from the crucibles.

This led to considerable discussion as to the life of iron pots. One foundryman said he got 85 to 90 heats from iron pots and another said he got from 40 to 50 from tilting iron pots. Mr. Anderson stated that the average was about 47 heats, but it depended upon the care of the pots. Mr. Weil stated that he is now getting 300 heats from a pot. He introduces a flame on a tangent 12 in. below the pot so that the flame does not come in contact with the pot. In his opinion the shape of the pot is a factor and he did not approve of square pots, but favored pots of smaller diameter and greater depth. He first sand blasts the pot and then coats it and found that this practice will eliminate the introduction of iron in the metal. He declared that trouble is caused because open-flame furnaces are not attended by competent men and, as a result, an oxidizing flame is not prevented. The furnace should be watched carefully to be sure that there is a reducing flame. William Krodel, Connecticut Brass Foundry, Waterbury, Conn., said he had used different crucibles and has found only one type furnace that did the work satisfactorily. The introduction of too much or too little air produces an oxidizing effect on the metal. He is now using two Hausefelt furnaces which give good results.

Mr. Skillman said that his company is melting 1,500,000 lb. per month and is using iron pots, crucibles and reverberatory furnaces. He recommended iron pots for small production. He said that if the pots are given a good cleaning once a day there would be fewer hard spots in the metal than if the pots are cleaned oftener. The complaint was made that many iron pots are of poor quality. Mr. Weil stated that their pots were made of steel and manganese scrap

and gray iron. He favored a pot that would conduct instead of resist heat. Mr. Krodel said that the Scovill Mfg. Co., Waterbury, Conn., has large furnaces on the second floor for melting and small furnaces on the ground floor for heating, which seemed very satisfactory.

Melting Aluminum for Sheets

"Melting Aluminum for Rolling into Sheets" was discussed by John A. Lange, Western Springs, Ill. He told of experiments made at the aluminum rolling mills of the Bremer-Waltz Corp., St. Louis, to determine the most suitable type of furnace for melting aluminum for sheet rolling. The tests were conducted on melting pots, tilting reverberatory and two types of combination revolving and tilting reverberatory furnaces. The combination reverberatory and tilting unit were similar in design, but the length of the reverberatory drums and speed of rotation were different. The one giving the best results was a combination revolving and tilting reverberatory furnace having a capacity of 1000 lb. It was equipped with a motor driven proportion mixer. The drum was 96 in. long and revolved once every 4 min. and 25 sec. The author described the melting practice employed with this furnace and gave comparative data for the four units. In conclusion he recommended quick melting preferably with a rotary furnace with a furnace temperature not exceeding 1800 deg. Fahr. He said the drawing qualities of the metal cannot be entirely judged by the analysis. He warned that silicon is objectionable and that the iron contents should not exceed 0.5 per cent and copper 0.33 per cent.

Mr. Lange, in the discussion of his paper, said that some imported aluminum rolls well, but cannot be used for containers of hot water such as tea kettles, also the grain of some imported aluminum opens under the draw press. He has given up the use of 98 per cent aluminum and is now using only 99 per cent and also has given up the use of manganese in aluminum. Aluminum with a small percentage of silicon resists corrosion better, provided the iron content is kept down, but he did not know what effect the presence of silicon would have on rolling. Mr. Anderson stated that in Germany aluminum with up to 11 per cent of silicon had been rolled, and suggested that the use of silicon in aluminum would be an interesting subject for research. A statement by Mr. Lange that aluminum sheets are being rolled for both slabs and molds brought from Mr. Anderson a reply that he regarded rolling from molds as bad practice.

Cracks in Aluminum Alloy Castings

R. J. Anderson presented a second paper, the subject of which was "Cracks in Aluminum Alloy Castings." The author said that the contraction in volume of aluminum is one of the principal factors affecting the occurrence of cracks and the question of shrinkage and its control require careful study in any treatment of cracking of castings. Cracks in sand and die castings have been attributed to a number of causes, but cracks in most light aluminum alloys are due to the large contraction in volume and the lack of its control. He gave as the most important factors, contractions in volume, composition of alloy, quality of metal, design of casting, method of molding, harness of ramming, method of gating, harness and character of cores, chills, risers, melting and pouring temperature, type of furnaces, inclusions in alloys, hot shortness and physical properties of high temperature.

The author stated that contraction in volume is variable in different alloys, depending on their composition. In general the contraction of aluminum-zinc alloys is greater than that of aluminum-copper alloys. One of the most important factors is the design of the casting. Thick and thin sections in contiguity form a prolific source of cracks. A round fillet placed at the junction of the two sections will lessen the danger of cracking. Generally it is necessary to chill heavy sections that are in contiguity with light ones so as to increase the rate of cooling in the former. The various details of molding are important in relation to the occurrence of cracks. Sand molds for aluminum alloys should be rammed lightly and evenly. The amount of ramming can be determined with a fair accuracy if power molding machines are used. One authority gave too hard cores as the principal cause of cracks. Too high melting and pouring temperature and the presence of foreign matter will aggravate the tendency to crack. Alloys that have fairly good strength at high temperatures are less likely to crack than those that are very weak.

The author stated that it is not expected that cracks will disappear, but by the observance of the precautions given, they may be largely eliminated. The contraction in volume is a fixed constant for a given alloy, so alloys that have an excessively large contraction should not be used for complicated castings or those of intricate design. This contraction may be controlled within limits by the correct use of risers and chills. Alloys should be chosen to meet the requirements. The quality of the melting charge should be controlled by chemical analysis. Castings should be designed correctly both from foundry and engineering standpoints. The simpler the design, the less will be the difficulty experienced in production. Experimental molding was recommended for determining the most suitable method for molding a particular casting. The use of horn gates where possible was also recommended. Much of the difficulty experienced with the cracking was attributed to cores and faulty core room practice.

Following the paper the subject was discussed at some length. E. H. Dix, Air Service, Dayton, Ohio, declared that liquid shrinkage does not cause cracks and that the principal cause is the high contraction shrinkage. Mr. Skillman said that badly designed castings are sure to result in cracked castings, and that much more is to be learned as to whether cracks are due to composition of the metal. Lately, he said, the lower silicon alloys had been rolled successfully, and the industry is now ready to learn something more about cracks in castings. He declared these have been reduced materially the past year or two and that the subject was one for the Bureau of Mines to work on.

Use of Secondary Aluminum Ingots

The use of secondary aluminum ingots in foundry practice was discussed by H. M. Weil, National Smelting Co., Cleveland, whose paper will later be printed and distributed. He said that competition in the aluminum foundries has caused a marked interest in the use of secondary aluminum, but its immediate adoption has been attended by disappointments to foundrymen and his paper dealt with the causes of these disappointments and the method for obviating them.

He declared that the melting of aluminum castings from secondary metal is comparatively simple if the characteristics of the metal are taken into consideration. The effect of temperature, fluxing and shrinkage are of prime importance. Temperature is important because of the strong affiliation of the metal for oxygen. Overheating or burning produces an excess of dross which is undesirable because of the high melting losses and because it is almost impossible to remove all of the oxide. Metal should therefore be poured as close to the melting temperature as possible, this varying according to the thickness and variety of the wall of the casting.

Although secondary aluminum is more sluggish than virgin aluminum and must be heated to a slightly higher temperature to obtain the same degree of fluidity, this increase in temperature, if properly controlled, will not increase oxidation. After the dross at the top of the bath of metal has been removed, there remains a quantity of finely divided oxide not visible to the eye, the results of which are harmful and cause disappointments to the foundrymen in the use of secondary aluminum. The oxide if not removed remains imbedded in the metal, weakening the natural bond between the molecules. This impairs the tensile strength, particularly at the higher temperature, and the ability of the metal to withstand strains set up in cooling, which in turn causes cracking. It is important therefore that this oxide should be removed. This is accomplished

(*Continued on page* 1783)

Investigation on Sulphur in Rivet Steel

Results of an Organized Research, Including Thousands of Tests on Treated and Untreated Material

THE preliminary report of the "Joint Committee on an Investigation of Phosphorus and Sulphur in Steel" dealing entirely with "Sulphur in Rivet Steel" was recently made public. It is to be presented in the regular way at the annual convention of the American Society for Testing Materials at Atlantic City, N. J., next week, though it will be published later in complete form as a Bureau of Standards technological paper.

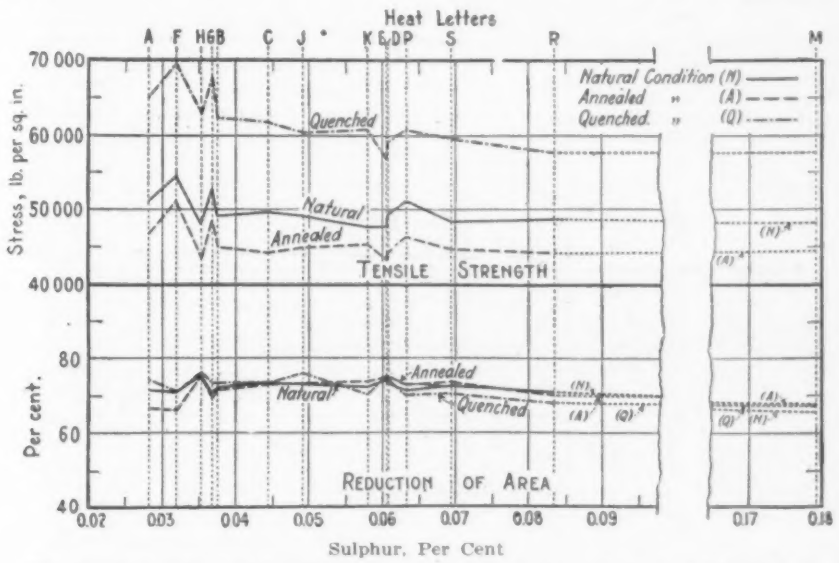


Fig. 8.—Comparison of Tensile Strengths and Reductions of Area of Rivet Bars in Natural, Annealed and Quenched Conditions. (Curves taken from Figs. 5, 6 and 7)

The report as published is voluminous and contains 33 diagrams, 31 of which are charts, giving the results of over 5000 physical tests and 1000 chemical analyses. No discussion as to the significance of the results nor any conclusions are presented, the entire report being a record of facts as determined. In order to stimulate interest in the subject and to develop discussion, an advance abstract of the report here is made available. A selected number of charts are reproduced to show representative results of the various tests.

Description of Material

The steel for this investigation was manufactured by the Carnegie Steel Co. In January, 1920, the committee on manufacture witnessed all stages of the process of manufacture of seven heats of basic open-hearth rivet steel and their rolling into rivet rounds. (Heats *F*, *G*, *H*, *J*, *K*, *P* and *M*, Table I). Seventy-five-ton heats were used, material not required for the investigation being routed elsewhere. In the manufacture of this material neither the ingots nor billets were allowed to go cold. The committee also accepted the offer of the company to furnish five ingots of basic open-hearth rivet steel, containing sulphur within the required range. The committee witnessed the entire process of rolling these five ingots into rods. (Heats *A*, *B*, *C*, *D* and *E*, Table I.) Heats *S* and *R* were made and rolled into rods subsequent to the visit of the committee. In Table I are given the average contents of sulphur, carbon, manganese and phosphorus, each value being the average of 14 analyses.

Each ingot was 18 by 21 by 72 in. (approximately 6400 lb.). After a top discard of 40 per cent, each ingot was rolled into six billets 4 by 4 by 48 in. (approximately 220 lb.). The billets were numbered from one to six in sequence from the top of the ingot and each was stamped with the heat and billet number. Billets 1, 2, 3 and 4 from each ingot were rolled into 63/64-in. rounds, each billet yielding eight bars 9 ft. 8 in. in length. Billets 5 and 6 from each ingot were later rolled into slabs. The bars were segregated into eight separate and similar groups, each group containing one bar from each of the four billets rolled into bars from each ingot, a total of 56 bars. Each bar was marked with the heat letter and with the position in the ingot of the billet, that is, 1, 2, 3 and 4. One group was sent to Watertown Arsenal, Watertown, Mass., a second to the U. S. Naval Engineering Experiment Station, Annapolis, Md., and a third to the Bureau of Standards, Washington, D. C. One group was retained by the manufacturer, and the remaining four groups were manufactured into rivets.

The test procedures outlined at the beginning of the investigation were followed as carefully and closely as possible by the two laboratories, so that the committee has obtained directly comparable test data from two separate laboratories on material practically identical.

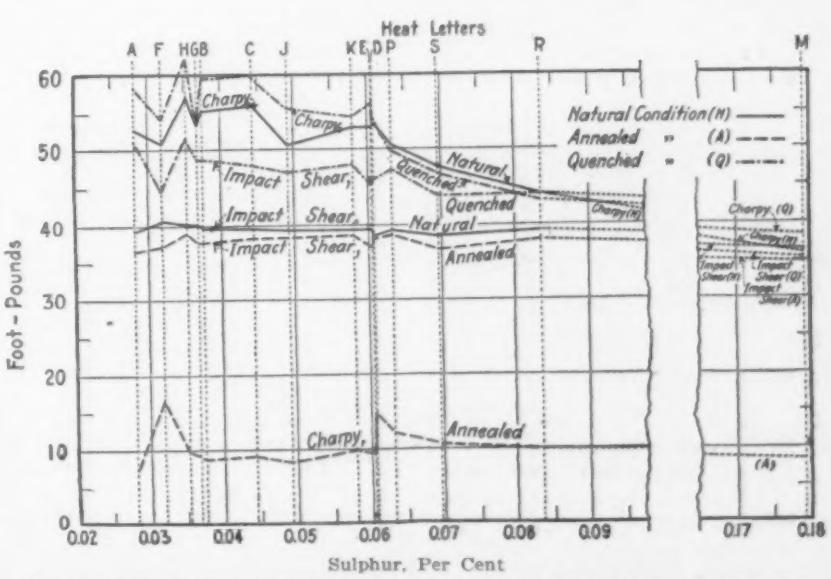


Fig. 12.—Comparison of Charpy and Impact Shear Values of Rivet Bars in Natural, Annealed and Quenched Conditions. (Curves taken from Figs. 9, 10 and 11)

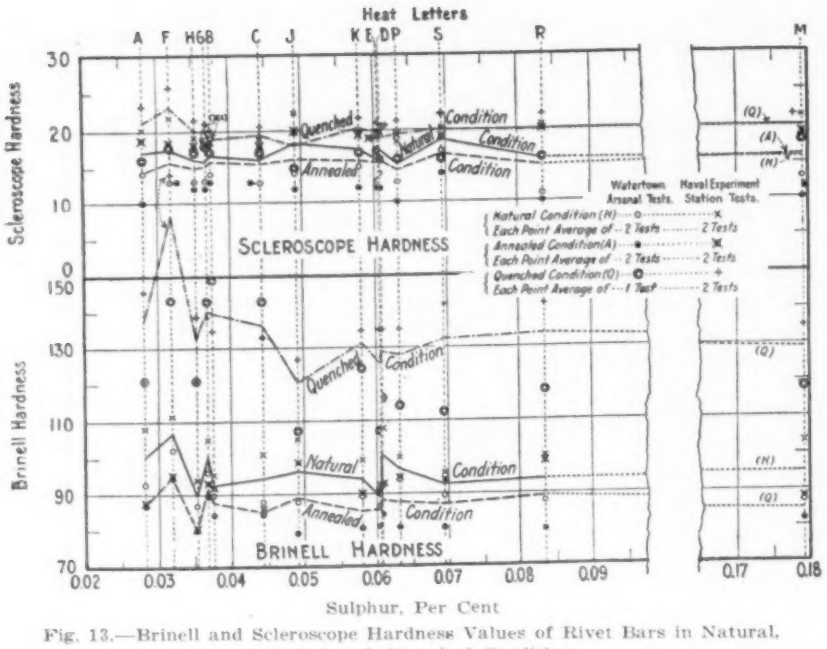

Heat Letters
A F H6B C J K E DP S R M
Scleroscope Hardness
Brinell Hardness
SCLEROSCOPE HARDNESS
BRINELL HARDNESS
Quenched Condition
Natural Condition
Annealed Condition
Watertown Arsenal Tests.
Naval Experiment Station Tests.
Natural Condition (N) — Each Point Average of 2 Tests — 2 Tests
Annealed Condition (A) — Each Point Average of 2 Tests — 2 Tests
Quenched Condition (Q) — Each Point Average of 1 Test — 2 Tests
Sulphur, Per Cent

Fig. 13.—Brinell and Scleroscope Hardness Values of Rivet Bars in Natural, Annealed and Quenched Conditions

[A description of the tests and methods is given, brief extracts from which follow.]

Heat Treatment.—The bars were first cut up into the required number of specimens. In the case of material to be heat-treated, the various pieces of bar thus obtained were annealed or quenched. In annealing, the pieces were heated to 925-950 deg. C. (1687-1742 deg. Fahr.) held for one-half hour and cooled in the furnace. In quenching, the pieces were heated to 925-950 deg. C. (1687-1742 deg. Fahr.); in the case of the Watertown Arsenal tests, they were held for one hour and in the case of the Naval Experiment Station tests for one-half hour before quenching in water at 21-23 deg. C. (70-73 deg. Fahr.). All machine work on specimens requiring machining was done after heat treatment.

Number of Tests.—At Watertown Arsenal, there were made for each heat six tension tests, eight Charpy and eight Izod impact tests, two Brinell and two scleroscope hardness tests, six bend tests, six torsion tests and six shear tests for material in natural condition, a like number of tests for material in annealed condition, and one-half that number of tests for material in quenched condition. (Izod and shear tests for heat *S* in natural and annealed conditions were not reported by this laboratory.) At the Naval Experiment Station, there were made for each heat six tension tests, eight Charpy and eight impact shear tests, two Brinell and two scleroscope hardness tests, four bend tests, six torsion tests and two shear tests for material in natural condition and for material in annealed condition. For material in quenched condition, three tension tests, four Charpy and four impact shear tests, two Brinell and two scleroscope hardness tests, four bend tests, two torsion tests and two shear tests were made for each heat.

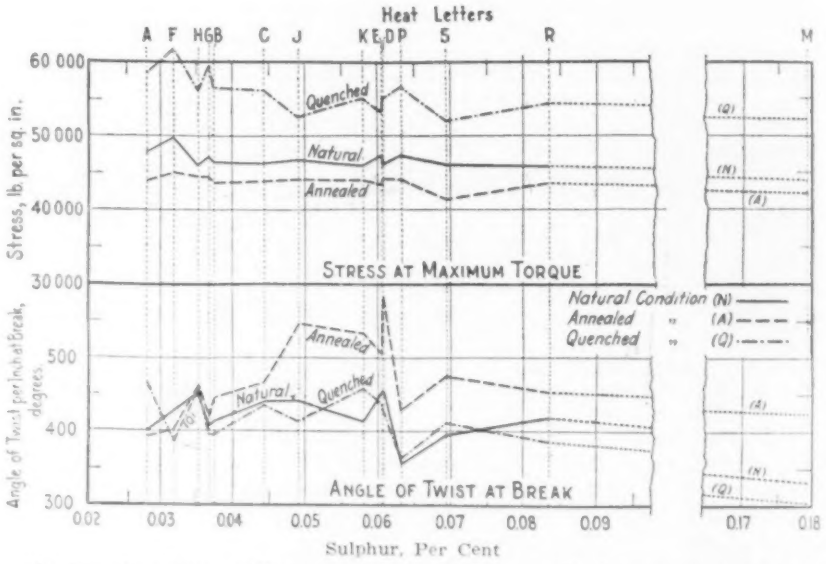

Heat Letters
A F H6B C J K E DP S R M
Stress, lb. per sq. in.
Angle of Twist per Inch at Break, degrees
STRESS AT MAXIMUM TORQUE
ANGLE OF TWIST AT BREAK
Natural Condition (N)
Annealed " (A)
Quenched " (Q)
Sulphur, Per Cent

Fig. 17.—Comparison of Stresses at Maximum Torque and of Angles of Twist per Inch at Break of Rivet Bars in Natural, Annealed and Quenched Conditions. (Curves taken from Figs. 14, 15 and 16)

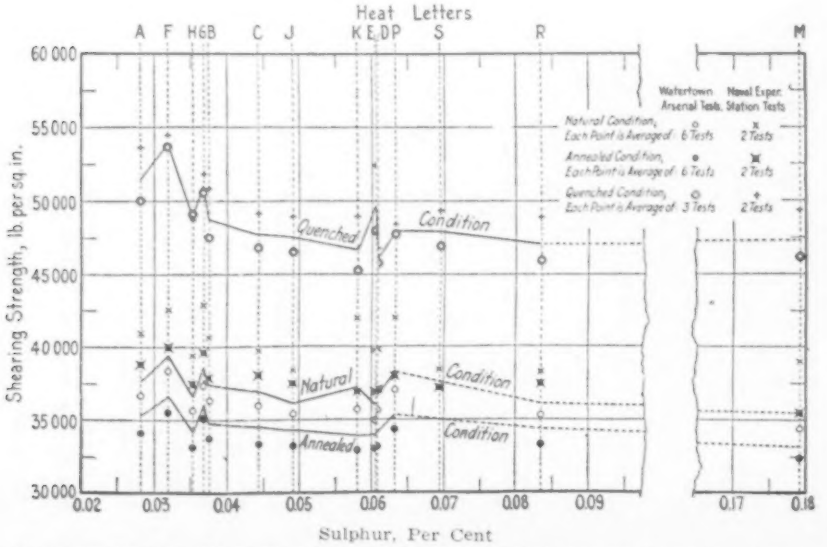

Heat Letters
A F H6B C J K E DP S R M
Shearing Strength, lb. per sq. in.
Watertown Arsenal Tests.
Naval Exper. Station Tests
Natural Condition, Each Point is Average of 6 Tests — 2 Tests
Annealed Condition, Each Point is Average of 6 Tests — 2 Tests
Quenched Condition, Each Point is Average of 3 Tests — 2 Tests
Quenched Condition
Natural Condition
Annealed Condition
Sulphur, Per Cent

Fig. 18.—Shearing Strengths of Rivet Bars for Natural, Annealed and Quenched Conditions

In addition, Frémont impact tests were made at Watertown Arsenal on a total of 20 specimens from each heat for the three conditions, which are not given in this preliminary report. Including these tests, there were 3180 tests made on the rivet bars.

Specimens. — Tension test specimens were the standard A.S.T.M. specimen ends. The Charpy and Izod impact test specimens (notched) are illustrated in the report. The impact shear specimens (unnotched) were ⅜ by ¼ by 3 in. The bend test specimens at Watertown Arsenal were full size, with the scale just turned off. At the Naval Experiment Station the bend test specimens were machined from the bars to rectangu-

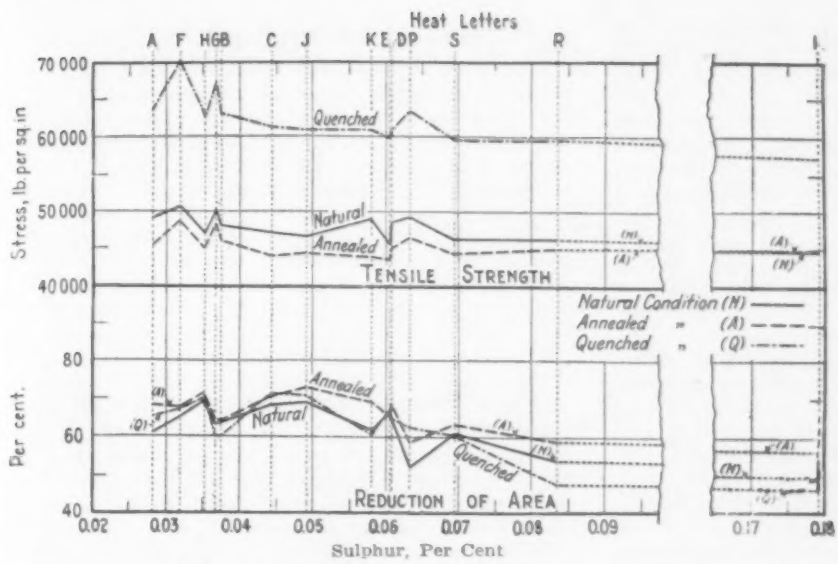


Fig. 23.—Comparison of Tensile Strengths and Reductions of Area of Rivet Steel. Specimens with longitudinal axes perpendicular to direction of rolling. Material in natural, annealed and quenched conditions. (Curves taken from Figs. 20, 21 and 22)

lar form (approximately 1 by ½ in. in cross-section) with corners rounded to a radius of 1/16 in. The torsion test specimens (9¼ in. long) were turned to a diameter of ¾ in. for a length of 5¼ in. with fillets at the shoulders of ⅜-in. radius. The shear tests were made upon full-sized specimens. All machine work was done at the respective laboratories.

Methods.—In general, the standard methods of the American Society for Testing Materials were followed where applicable. Brinell hardness was determined at each laboratory upon a 3000-kg. Brinell machine. Bend tests were made by first bending the specimen to an angle of 60 deg., using a die block with faces at 60 deg. and nose rounded to a radius of ¼ in., and then to 180 deg. flat on itself between the heads of a tension testing machine. The 1 by ½-in. specimen used at the Naval Experiment Station was bent with the 1-in. face against the die block. The shear tests at both laboratories were made in a suitable double shear fixture, the load being applied with the tension testing machine.

Tests of Rivets

Rivets were tested as follows: Shanks bent cold in natural condition; shanks bent cold in quenched condition; heads flattened hot; shanks flattened hot; shanks upset cold; and shanks upset hot. Riveted joints with rivets in single and double shear were also tested. The hot flattening and hot upsetting tests on shanks were made only at Watertown Arsenal; all other tests were made at both laboratories.

Each laboratory received twelve rivets of each length (2¾, 3½ and 6 in.) and of each type of head, cone and button; a total of 72 rivets from each heat, excepting heat *S*, from which no rivets were manufactured.

No chemical analyses were made of any of the rivets, so that all tests are referred to the average chemical determinations made on the rivet bars and slabs for the respective heats.

The total number of tests of rivets was 962. [A description of the various bend, flattening and upsetting tests follows. There are also charts showing the average carbon, manganese and phosphorus contents plotted against the average sulphur content of each heat; also typical stress-strain curves.]

Table I—Average Chemical Compositions, with Mean Divergences

Each value is the average of separate analyses on 14 samples from each heat. The heats are arranged in the order of increasing sulphur contents.

Heat Letter	Ingot Hot or Cold	Sulphur, Per Cent	Carbon, Per Cent	Manganese, Per Cent	Phosphorus, Per Cent
A	Cold	0.0282 ± 0.0015	0.136 ± 0.0037	0.426 ± 0.021	0.0062 ± 0.0005
F	Hot	0.0317 ± 0.0016	0.149 ± 0.0043	0.642 ± 0.0075	0.0082 ± 0.0017
H	Hot	0.0355 ± 0.0015	0.110 ± 0.0025	0.362 ± 0.0037	0.0055 ± 0.0015
G	Hot	0.0367 ± 0.0020	0.137 ± 0.0037	0.466 ± 0.0037	0.0085 ± 0.0015
B	Cold	0.0377 ± 0.0009	0.112 ± 0.0080	0.392 ± 0.012	0.0082 ± 0.0009
C	Cold	0.0444 ± 0.0026	0.107 ± 0.0075	0.455 ± 0.005	0.0082 ± 0.0012
J	Hot	0.0492 ± 0.0016	0.107 ± 0.0037	0.355 ± 0.0062	0.0062 ± 0.0027
K	Hot	0.0580 ± 0.0030	0.115 ± 0.0050	0.411 ± 0.0087	0.0105 ± 0.0025
E	Cold	0.0606 ± 0.0033	0.104 ± 0.0037	0.457 ± 0.006	0.0105 ± 0.0010
D	Cold	0.0608 ± 0.0012	0.094 ± 0.0040	0.385 ± 0.015	0.0127 ± 0.0020
P	Hot	0.0633 ± 0.0018	0.116 ± 0.0037	0.432 ± 0.005	0.0240 ± 0.0030
S	Hot	0.0695 ± 0.0028	0.104 ± 0.0043	0.420 ± 0.020	0.0117 ± 0.0003
R	Hot	0.0834 ± 0.0033	0.106 ± 0.0037	0.472 ± 0.0025	0.0112 ± 0.0030
M	Hot	0.1793 ± 0.0027	0.106 ± 0.0037	0.512 ± 0.0075	0.0060 ± 0.0030

Tests of "Transverse" Material from Slabs

From the slabs (5¼ by 1 in.) rolled from each heat, specimens were secured whose longitudinal axes were perpendicular to the direction of rolling the slabs. These specimens were tested in tension, impact (Charpy and impact shear), hardness (Brinell and scleroscope), bend, and shear. The impact shear tests and the static shear tests were made only at the Naval Experiment Station, and the hardness tests were made only at Watertown Arsenal. The other tests were made at both laboratories.

One slab from each of the 14 heats was tested at Watertown Arsenal and one at the Naval Experiment Station. At both laboratories material was tested in natural condition "as received" and in annealed condition. At the Naval Experiment Station, tests were also made on material in quenched condition.

Presentation of Test Data

As previously explained, separate chemical analyses were made on 14 samples of material from each heat, sulphur, carbon, manganese and phosphorus being determined in each analysis. In order to obtain some uniform basis for plotting the physical properties, the committee averaged for each heat the 14 reported determinations of sulphur, carbon, manganese and phosphorus. These average values, with the mean divergences, are given in Table I. The average sulphur content for each heat as thus de-

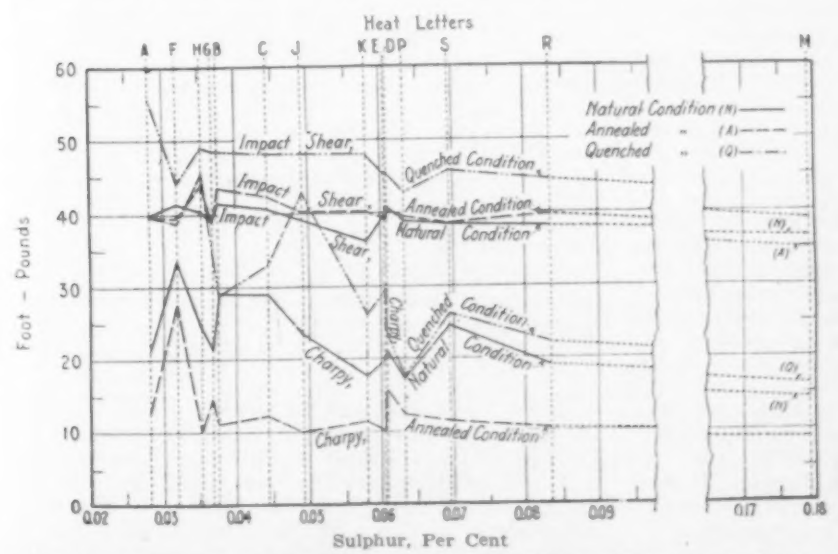


Fig. 27.—Comparison of Charpy and Impact Shear Values of Rivet Steel. Specimens with longitudinal axes perpendicular to direction of rolling. Material in natural, annealed and quenched conditions. Impact in direction of long dimension of slab. (Curves taken from Figs. 24, 25 and 26)

termined is used for that heat throughout in plotting the figures. The heats are arranged in the table in the order of increasing average sulphur content. The phosphorus contents are low and quite uniform. It was desired that the carbon in these steels should range from 0.06 to 0.12 per cent, but only in the case of three heats (*A*, *F* and *G*) is the carbon content above 0.12 per cent. (The average of the carbon contents of all heats is 0.115 per cent.) There is a greater variation in the manganese content. The aim was to secure steels with manganese from 0.35 to 0.40 per cent. While none of the steels fell below 0.35 per cent of manganese, some ran much higher than was intended. (The average of the manganese contents of all heats is 0.442 per cent.) The influence of the higher manganese contents of heats *F* and *G*, combined with the higher carbon contents of the same heats, is clearly indicated in the study of the physical properties.

For the purpose of this preliminary report the committee decided to present all of the data on physical tests in graphical rather than tabulated form, since the use of curves permits of far readier study of the significance of the tests. In the figures that follow, the percentages of sulphur are plotted as abscissas and the various properties determined are plotted as ordinates. Light vertical dotted lines are drawn at the average sulphur contents for each heat (Table I) and are marked with the corresponding heat letters. The same vertical scales are used in the different figures wherever possible, and the endeavor has been made in plotting properties expressed in different units to use proportionate scales. Thus, stresses in tension are reported between limits of 0 to 70,000 lb. per sq. in. and impact values between limits of 0 to 70 ft.-lb. Hence, scales were adopted in plotting these values such that one space interval represents 10,000 lb. per sq. in. and 10 ft.-lb., respectively. In this way comparative study of the curves is facilitated. The results obtained at the two laboratories are plotted separately. Straight lines have been drawn connecting the average of the values obtained at the two laboratories for successive heats, these averages being determined with regard to the number of tests of which each plotted value is the average.

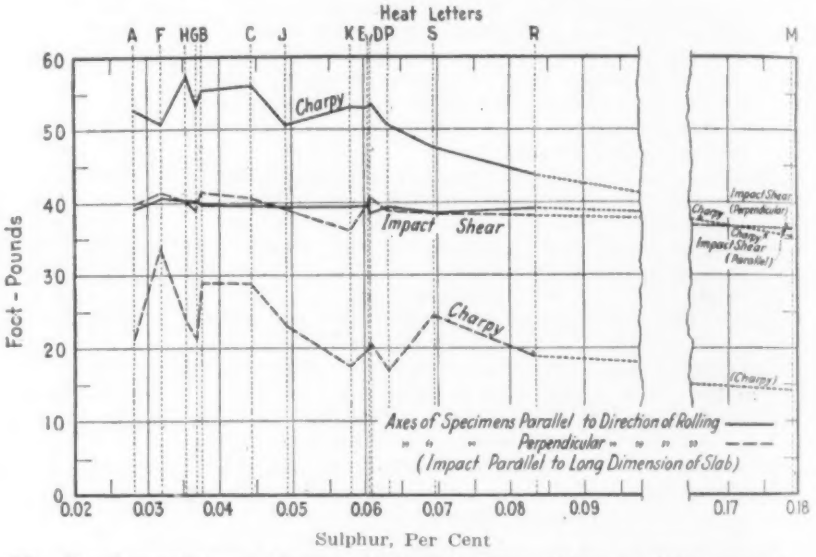


Fig. 33.—Comparison of Charpy and Impact Shear Values of Rivet Steel in Directions Parallel and Perpendicular to Direction of Rolling. Material in natural condition. (Curves taken from Figs. 9 and 24)

Separate curves have been drawn for tests on material in the natural, annealed and quenched conditions. Where this has required separate figures for each condition (as in the case, for example, of the tension, impact and torsion tests), other figures have been prepared (Figs. 8, 12, 17, 23 and 27) in which curves for certain of the physical properties for the three conditions have been grouped for purposes of ready comparison.

Discussion

As has previously been stated, the joint committee, while it has reviewed all of the test data in this investigation, prefers to defer any extended discussion of the results and the drawing and publishing of formal conclusions therefrom. From its study of the data, however, the joint committee has realized the possibilities that exist for comparative study of the various properties herein reported.

A metallographic study of this material has been made by the joint committee and will be reported in the later complete publication.

The report is signed by George K. Burgess, Bureau of Standards, as chairman. The committee has 16 members, representing 11 different organizations.

A new theater at Niles, Ohio, has been named the Butler Theater in honor of J. G. Butler, Jr., vice-president Brier Hill Steel Co., Youngstown, Ohio.

Cost of Living Rises in May

Monthly figures of the Bureau of Labor Statistics show the wholesale prices of all commodities during May to be 48 per cent above the average for 1913, compared with 43 per cent in April (52 per cent, according to the classification used until June 1, and now superseded), 52 per cent in March, 51 per cent in February, 48 per cent in January and 49 per cent in both December and November. These older figures are all based on the old classification. The revision, which involved a regrouping of commodities, the addition of a number of new items and the use of the 1919 census data, in place of 1909, for weighting purposes, makes direct comparison with earlier figures a matter of uncertainty.

In spite of recent increases in iron and steel prices, metals and metal products, which now stand at 19 per cent above the 1913 average, are far lower than any other group listed, except the miscellaneous. This item is now 13 points below farm products, and 41 points below building materials.

While metals are only 19 per cent above their 1913 level, the average of all the others is almost three times as far above the 1913 level.

Our table shows the figures for the two most recent months and for May, 1921, and the peak in 1920. It shows also the amount of liquidations, between the 1920 peak prices and the present, of the excess of the peak prices over the average of 1913. In the table A, at the foot of a column, indicates the figures under the old classification; B, the new.

Index Numbers of Wholesale Prices, by Groups of Commodities
(1913 equals 100)

	1920 Peak	1921 May	1922 April	1922 April	1922 May	Liquidation, Per Cent
Farm products	246	118	129	129	132	78.1
Food, etc.	287	139	137	137	138	79.7
Cloths and clothing	356	173	181	171	175	70.7
Fuel and lighting	284	200	187	194	216	37.0
Metals and metal prod.	195	138	117	113	119	80.0
Building materials	341	165	201	156	160	75.1
Chemicals and drugs	222	134	160	124	122	82.0
House-furnishing goods	371	209	211	175	176	72.0
Miscellaneous	247	126	152	116	116	89.1
All commodities	272	145	152	143	148	72.1
		B	A	B	B	

Labor and Industry is the name of a monthly bulletin which the Department of Labor and Industry of Pennsylvania has decided to issue to present the current information emanating from the department. If the venture proves successful, Clifford B. Connelley commissioner of Labor and Industry, proposes to discontinue publication of yearly reports in bulletin form. The editor is S. P. Hollingsworth. In a measure the publication is a resumption of the monthly bulletins discontinued prior to the World War.

Foundries Can Use Lower Silicon Irons

Blast Furnacemen Would Be Relieved by Lessened Demand for High Silicon Pig—Call for High Phosphorus Iron May Be Overdone Also

BY Y. A. DYER

SINCE the almost general application of chemistry and metallurgy to cupola practice there have come various vexatious problems, chief among which is the standardization of iron mixtures for sundry lines of castings.

It has not been so much a question of the most attractive chemical analyses to create support or bulwark in the metal to meet adequately the stresses and strains to which it is subjected in performing the highest duty as a construction member, but rather that of a uniform supply of pig iron of desirable analysis, as a base metal, under varying market conditions. This condition is not peculiar to any one section.

Some foundries have accommodated their mixtures to high silicon foundry irons, depending on large quantities of such metal during "flush times," when furnace production is large and the grades are more diversified or irregular—a condition largely created by "hard driving" of furnaces for output. During leaner times the furnaces are more cautiously driven, and an effort is made to produce grades which result from an economical furnace practice. This policy means that the average operator, North and South, attempts so to burden the furnace and manipulate practice as to produce a foundry iron of standard silicon range—1.75 to 2.75 per cent.

What High Silicon Means to the Furnace

Ordinarily the silicon runs higher in Southern foundry irons than in Northern irons—due to using for the former a larger quantity of ore, per ton of iron and ore of more siliceous character, together with more coke of higher earthy or ash percentage for smelting the ore. The production of silicon, from the silica of the ore gangue and coke ash, is accentuated by a hot-working furnace on a normal lime burden and slag composition. For other causes silicon may be raised in the iron—notably one: when fluxing material is increased to raise the slag temperature to act as a heat transmitter to the iron. This condition, of course, is caused by some irregularity of operation, hence, may not be depended on by the foundryman as a guarantee of his getting a regular supply of high silicon iron. At all events, more heat means more coke, more lime or hotter blast; hence, the furnace operator, being highly desirous of keeping coke consumption down to a minimum, is not particularly interested in making very high silicon irons as a standard grade, even though he may secure a premium for them. An unusually hot furnace drives slower, which means decreased output of iron, thus creating another condition which the operator does not desire. Therefore, any condition which militates against minimum coke consumption and maximum output and creates irregular working naturally is "tabooed" by the iron producers. Unfortunately for the foundryman who insists that he needs very high silicon iron, these conditions "spell" a higher price for the iron and sporadic supply during periods of normal grade production.

If energy be applied to the problems of fuel combustion and thermophysics of molten iron, instead of exercising sheer faith in high silicon irons, highly satisfactory results may be had from the use of lower silicon irons. The fact is that a medium silicon iron may be superheated to a degree making it entirely practical for all purposes to which cupola metal is applied; at the same time the foundryman will be more certain of getting an adequate supply of desirable iron under varying conditions in the pig iron market. He may also relieve himself of paying premiums for higher silicon content.

High Phosphorus Southern Irons

To Northern foundrymen, particularly, phosphorous is also of interest in view of the scant percentage usually found in Northern pig irons. A large percentage of Northern users of Southern iron are content with the usual 0.85 to 1.10 per cent standard Alabama specification, yet there are quite a few who insist on 1.20 to 1.50 per cent phosphorous, and without special regard to price. There are points in the South where such a phosphorous specification is regular, but at the present time there is not a furnace in blast in the Southern States that can supply such an iron on regular specifications. Under extraordinary market conditions furnaces producing higher phosphorus irons are in blast, but the point is that the supply cannot be depended on in leaner times. Therefore, foundries that have accommodated their standard mixtures to a low ratio mix of 1.20 to 1.50 per cent phosphorus iron can find easier sailing by increasing the ratio of 0.85 to 1.10 per cent phosphorus iron—if there is a closed conviction that high phosphorus content is essential to fluidity at the expense of soundness and strength.

The element manganese, by common consent, is a cure for many of the ills to which cast iron is heir. Cast iron, like the body, is a breeder of germs, and, as in the case of the body, the best treatment is to prevent an infection on which the germs may thrive. If the oxygen germ and the sulphur germ be present in the iron, the best-known panacea is manganese to flux from the "system" these pests, or at least minimize their number.

Mixing Northern and Southern Irons

By long experience the Northern foundryman has learned that by mixing Southern irons with Northern irons he is able to confine the phosphorous and manganese within certain prescribed limits in his mixtures, thereby producing the ideal chemical and physical analyses for various lines of castings. It is also well known that a blend of Northern and Southern irons gives strong physical characteristics. Therefore, the Southern foundryman may well afford to emulate his Northern brother and use Northern irons with Southern irons in his efforts to raise the standard of his castings.

Special Northern irons are low in phosphorous and high in manganese, and standard Southern irons are high in phosphorous and low in manganese. When the two are mixed in the correct proportions, phosphorus and manganese are controlled to the point necessary to produce a casting of maximum strength and toughness, avoiding the brittleness due to high phosphorus and creating strength and toughness by medium or high manganese content. Manganese offsets "red-shortness," due to oxygen which may be retained in the iron, by fluxing it as manganous oxide; also prevents excessive sulphur by fluxing it as manganese sulphide.

What Can Be Done in Mixtures

Note the difference in analysis of special Northern and standard Southern irons:

	Silicon	Sulphur	Phosphorus	Manganese
Northern.	2.25 to 2.75	0.025 to 0.05	0.20 to 0.35	1.25 to 1.50
Southern.	2.25 to 2.75	0.025 to 0.05	0.90 to 1.10	0.25 to 0.60

By mixing from 30 to 50 per cent of this Northern

iron with 70 to 50 per cent of Southern iron, an average range of analyses may be obtained as follows:

Silicon	Sulphur	Phosphorus	Manganese
2.25 to 2.75	0.025 to 0.05	0.60 to 0.75	0.75 to 0.85

For regular routine foundry work the 50-50 per cent Northern-Southern iron mixture cannot be surpassed for the following chemical analyses:

Pig	Scrap	Castings	Si	S	P	Mn
30 per cent	70 per cent	Heavy	1.70	0.09	0.60	0.45
40 per cent	60 per cent	Medium	1.85	0.09	0.60	0.50
60 per cent	40 per cent	Light	2.10	0.08	0.60	0.55

Cupola charges per ton (2000 lb.) of metal would be as follows to produce castings of above analyses:

	Lb.
Heavy:	
15 per cent Northern iron	300
15 per cent Southern iron	300
70 per cent No. 1 scrap	1,400
	2,000
Medium:	
20 per cent Northern iron	400
20 per cent Southern iron	400
60 per cent No. 1 scrap	1,200
	2,000
Light:	
30 per cent Northern iron	600
30 per cent Southern iron	600
40 per cent No. 1 scrap	800
	2,000

Of course for less important work more scrap may be used; but for special high-duty castings a larger percentage of Northern iron would be necessary to lower the phosphorus and raise the manganese. Desirable analyses may be worked out from this average mixture of 2.50 per cent silicon for the two pig irons, or even lower silicon if light weight (thin section) scrap be used.

Sands Used in Aluminum-Alloy Foundry Practice

The Bureau of Mines, as one of the Governmental agencies directly co-operating in a general research of all foundry sands, organized by the American Foundrymen's Association and the National Research Council, is collecting data on sands for molds and cores in aluminum-alloy foundry practice.

There is pressing need of collated information on such sands used, and it is hoped to aid in disseminating knowledge on the subject. A questionnaire is being sent by the Bureau of Mines to aluminum-alloy foundries in the United States in order to obtain data to be used in the preparation of a report. Some foundries of this kind may not be upon the Bureau's mailing list, and it is hoped that any such plants that do not receive the questionnaire will apply for one. The contents of individual communications will be held strictly confidential. Communications in regard to the matter should be addressed to R. J. Anderson, metallurgist, U. S. Bureau of Mines Experiment Station, Pittsburgh, Pa.

Post-War Cost Factors for Use in Tax Claims

WASHINGTON, June 20.—Structural steel is given a ratio of 60 per cent, and other steel products a ratio of 90 per cent, based on prices as of June 30, 1916, in a Treasury decision issued by the Commissioner of Internal Revenue with reference to ratios of estimated post-war cost of replacement for use by taxpayers in computing claims for tentative allowance amortization. The ratios, condensed to cover sixteen groups, it is pointed out, are necessarily composite figures, arrived at by an examination of many items entering into respective groups, and it is realized that in some cases where only a limited number of items in the group are involved, the ratios given may not fairly be applicable to a particular case. In such cases the claim for amortization should be made in accordance with the ratios published, but the taxpayer along with his claim is required to submit a statement showing in detail the reasons why, and the extent to which the ratio is not properly applicable. The purpose of fixing the ratios is to facilitate the preparation and examination of claims and to bring about, to such extent as may be practicable, uniformity as to the basis of claims. Allowances based on these ratios will be purely tentative and subject to redetermination in accordance with the provisions of the law.

Other ratios given and which are of interest to the iron and steel and metal working trades are as follows:

Ratios for Computing Estimated Post-War Cost of Replacement of Buildings, Vessels, Cars, Tanks, Blast Furnaces, Open-Hearth Furnaces, Annealing Furnaces, Electric Furnaces, Coke Ovens, and Construction of All Kinds

Building equipment	150
Labor (all classes)	160
Electrical machinery and equipment	130
Engines, turbines, compressors, and similar facilities	175
Pumps	135
Boilers	160
Transmission equipment:	
(*a*) Shafting, pulley, hangers, etc	135
(*b*) Belting	190
Machine tools and small tools (machine tools are considered as that class of metal working machinery which can be used on *both* cast iron and steel)	130
Wood-working machinery	155
Textile machinery	155
All other machinery (including cranes):	
(*a*) Machinery, the cost of which did not exceed 10c. per lb. as of June 30, 1916	120
(*b*) Machinery, the cost of which did exceed 10c. per lb. as of June 30, 1916	130

To Help American Shipbuilders

WASHINGTON, June 20.—American steel manufacturers, shipbuilders, and others interested in the supplying of material for ships and in the construction of ships, have shown considerable interest in the successful outcome of the conferences on June 7, between former Senator George E. Chamberlain, one of the commissioners of the Shipping Board, and S. P. Gilbert, Jr., Under-secretary of the Treasury, which means that the American shipowner seeking benefits of the Jones merchant marine act will be protected from conflicting interpretations in the two departments. The conference between Commissioner Chamberlain and Undersecretary Gilbert followed a conference between representatives of the Shipping Board and of the Treasury Department, at which rules and regulations were compiled to make possible the application of the provisions of Section 23 of the Merchant Marine act, 1920, which has in view the encouragement of new ship construction in American yards by the waiver on the part of the Government of certain income taxes on earnings or profits when the owner constructs new vessels for operation under the American flag.

Magnesite in 1921

Reports received by the U. S. Geological Survey from producers of magnesite show that the quantity of crude magnesite sold or treated during the calendar year 1921 was 47,904 net tons, valued at the mines at $510,177. This quantity was less than half that for the year 1920, and smaller than that for any year since 1916. California was the only producing State, and nearly all the product was calcined for use as plastic material. The output of domestic magnesite for use in refractory products was very small.

In contrast to the large decrease in domestic production there was an increase in imports, which consisted chiefly of crude magnesite. The apparent consumption of magnesite in the United States in 1921 was equivalent to about 113,500 tons of crude magnesite, 58 per cent of which was imported. This consumption is the lowest recorded for many years.

Production of Aluminum in 1921

The value of the aluminum produced in the United States in 1921 was $10,906,000, as compared with $41,375,000 in 1920, according to the U. S. Geological Survey. This great decrease was due not only to a decrease in the price of the metal but to the large curtailment of its use in the automotive industries. Imported aluminum could be bought throughout the year at 2 to 3c. below the prices quoted for domestic metal of the same grade. The imports of semi-manufactured aluminum in 1921 were 32,665,300 lb., as compared with 39,298,650 lb. in 1920. The exports of aluminum in 1921 were 2,196,100 lb., as compared with 9,407,650 lb. in 1920.

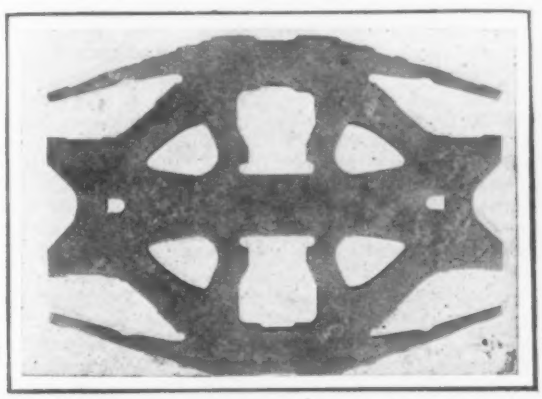
EXHIBITS AT RAILROAD MEETING

Mechanical Features at Convention of American Railway Association at Atlantic City

In conjunction with the annual conventions of the American Railway Association and the Railway Supply Manufacturers' Association at Atlantic City, from June 14 to 21, inclusive, an exhibit of railroad equipment was held on Young's Million Dollar Pier. This exhibit was omitted last year, but this year it was larger than ever. There were 341 exhibitors occupying 96,000 sq. ft. of floor space, probably the greatest exhibition of mechanical equipment that is held in the United States at any time during the year.

Exhibits of cars and locomotives were held on a side track a short distance from the pier and included one of the 50 locomotives which the Baldwin Locomotive Works is building for the Southern Pacific Railroad. A special feature of this locomotive is that the crown and side is in one plate, which was rolled on the large mill of the Lukens Steel Co. This plate measures 195½ x 247 in. x ⅝ in. in thickness, and is one of the largest plates ever rolled for this purpose. The wrapper sheet, which is next to the firebox, also is in one piece, 149 x 270 in. x ⅝ in. in thickness, which was also rolled on the Lukens large mill.

Shown for the first time anywhere, the Symington truck side frame for freight cars, made from a steel plate, attracted attention. This side frame will be sold by the T. H. Symington Co., Rochester, N. Y., but will be manufactured at the car works of the Midvale Steel & Ordnance Co., at Johnstown, Pa. The frame is formed from a single plate of open-hearth



The First Operation in Preparing the Steel Plate for the Car Truck Frame Is the Cutting of the Blank on a Hydraulic Press

steel by the successive operations of blanking, flanging and folding. From a steel plate of suitable size the blank for the entire frame is produced in one piece by means of blanking and shearing dies under a hydraulic press. The blank, after marginal flanges are formed around its edges and around the principal openings, at one stroke of a hydraulic press, is folded along two lines parallel with the center line, as noted in illustrations. The flanges are electrically welded at points of contact, as indicated. These side frames weigh about 300 to 600 lb. each, depending on the weight of the car, and four are required for each car. It is the expectation of the Midvale Steel & Ordnance Co. that the manufacturing operations will soon occupy a considerable part of its car-shop capacity at Johnstown.

Machine-Tool Exhibits

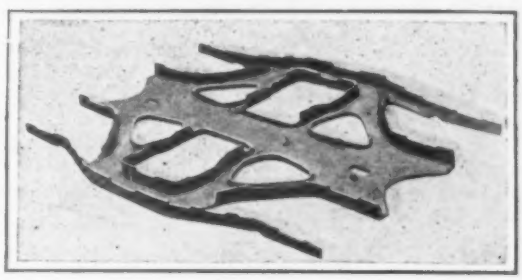
In the machine-tool section one of the interesting exhibits was that of Henry Pels & Co., 90 West Street, New York, who showed steel plate frame punches and shears. Two new features were a gate shear and a double-end bar and angle shear. The gate shear is a recent importation. The machine exhibited cut plates up to 80 by ⅝ in. at one stroke.

The Hendey Machine Co., Torrington, Conn., exhibited a new 24-in. crank shaper, equipped with a speed change gear mechanism, giving eight speeds in all in geometrical progression.

The Laughlin & Barney Machinery Co., Union Arcade, Pittsburgh, exhibited a new tube shearing machine. The shearing principle consists of an internal arbor and two shear knives in the form of two hardened steel rings, which are placed close together and through which the pipe or tube passes. The shear knives do not revolve. One knife is being held concentric and the other knife is carried in the shear head, which follows an eccentric path, causing the pipe or tube to be sheared off in one revolution of the machine. These machines can be furnished for shearing practically any size tubing of various kinds of material to be cut into short or long lengths or into ferrule lengths.

The Ajax Mfg. Co., Cleveland, showed a new model bolt header and forging machine, especially designed to take care of alloy steels. The new model is of approximately 30 per cent greater weight and capacity than the ordinary machine.

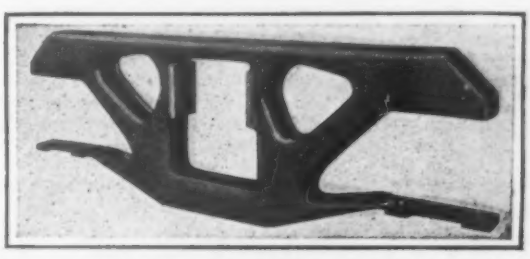
The Mahr Mfg. Co., Minneapolis, in addition to



The Second Operation Includes the Flanging of the Plate

its regular line of "Mahrvel" products, showed two new devices, its No. 14 oil fuel rivet forge and the Mahr direct-connected steel pressure blower. The rivet forge is designed for use in places not accessible to the larger machines. Rivets are heated in plain sight and their exact temperature, it is stated, can be determined at a glance. It is of steel welded construction and is furnished with special three-piece tile lining. Its specifications are: tank capacity, 5 gal.; oil consumption, 1¾ gal. per hr.; air consumption, 8 cu. ft. per min.; normal capacity, 400 ¾ x 3-in. rivets per hour. The Mahr direct-connected steel pressure blower is for use in connection with oil and gas-fired furnaces. It is designed for a standard pressure of 10 oz. per sq. in., but may be modified to deliver air at slightly higher or lower pressures.

The Niles-Bement-Pond Co., New York, had on its exhibit its new turret tool post, which includes



The Flanged Plate Is Folded as Indicated with Welding Where Needed and the Side Frame Is Ready for Assembly of the Truck

among its features the mounting of the roughing tool separately from the turret, in the solid part of the post, and the arrangements of the other tools so as to require but two quarter-turn indexings to complete the turning of a wheel. The turret revolves vertically and is locked in position underneath by a wide taper wedge, thus to make the turret practically a solid unit with the cross slide. The wedge is easily and quickly withdrawn and locked again after indexing. The arrangement of the tools in the turret is such as to require a minimum amount of transversing of slides, the tools presenting themselves practically in position as the operations progress.

The Standard Electric Crane & Hoist Co., 1420

Chestnut Street, Philadelphia, attracted attention to its exhibit by a display in operation of its new Standard electric hoist, which saves headroom as compared with older designs. Where a hoist must be used in a building with a low ceiling, this hoist is said to have many advantages, chief among which is that it will raise a given load 30 to 50 in. higher than is ordinarily possible.

The Elwell-Parker Electric Co., Cleveland, showed a novel product, an industrial truck, electrically operated, combined with a small crane which has a capacity of 3000 lb. at 6 ft. radius and 1000 lb. at 12 ft. radius. The capacity of the truck is 3000 lb. The crane is mounted solidly on the truck and is operated from the same motor as the truck itself. The combined truck and crane is especially designed for handling heavy castings or other heavy handling. This company also showed a new wheeled-platform for use with Elwell-Parker electric elevating trucks.

The Electric Controller & Mfg. Co., Cleveland, showed for the first time a new automatic starting compensator with thermal overload trip.

The Landis Machine Co., Waynesboro, Pa., demonstrated its new automatic die head, mounted on a Warner & Swasey turret lathe.

In the booth of the Niles-Bement-Pond Co., the R. K. Le Blond Machine Tool Co., Cincinnati, showed its new 25-in. heavy-duty engine lathe, designed for turning any heavy work. A feature of this machine is that it has 16 speed changes.

Other Exhibitors

Among other exhibitors whose products are used in the various metal working industries, as well as in the railroad field, were the following:

Aeroil Burner Co., Union Hill, N. J., portable oil burners, kerosene blow torches, etc.; Air Reduction Sales Co., New York, oxyacetylene welding and cutting machines and various other units of "Airco" and "Airco"-Davis-Bournonville manufacture; Allegheny Steel Co., Brackenridge, Pa., journal box lids, truck spring plates and miscellaneous steel stampings; American Abrasive Metals Co., New York, brake shoes, safety car steps, heat-resisting castings; American Car & Foundry Co., New York, featuring its Berwick electric rivet heater, rod heater and drop forging heater, described in THE IRON AGE of June 8, 1922, page 1604; American Chain Co., Bridgeport, Conn., railroad chains; American Locomotive Co., New York; American Malleable Castings Association, Cleveland, miscellaneous line of castings for car construction; American Steam Gauge & Valve Mfg. Co., Boston, various types of gages; American Steel Foundries, Chicago, steel castings for railroad equipment; American Tool Works Co., Cincinnati, lathes and radial drills; Association of Manufacturers of Chilled Car Wheels, Chicago, various types of car wheels; E. C. Atkins & Co., Indianapolis, "Silver Steel" saws of all kinds.

R. L. Baker & Co., Cleveland, electric tractor and platform trucks; Barrett Co., New York, roofing, waterproofing, etc.; Beaudry & Co., Boston, Beaudry hammer; S. F. Bowser & Co., Fort Wayne, Ind., storage tanks for oil and gasoline; W. L. Brubaker & Brothers Co., New York, special boiler tools; Buckeye Steel Castings Co., Columbus, Ohio, steel castings for cars; Bucyrus Co., South Milwaukee, Wis., railroad wrecking cranes, excavating machinery, etc.; Burden Iron Co., Troy, N. Y., staybolt and engine bolt iron, iron boiler rivets.

Carborundum Co., Niagara Falls, N. Y., Carborundum refractories and grinding wheels; Carnegie Steel Co., Pittsburgh, engine and car wheels; Chicago Pneumatic Tool Co., New York, pneumatic and electric hammers, drills, air hoists, sand rammers, etc.; Clark Tructractor Co., Buchanan, Mich., Clark "Truklift"; Cleveland Pneumatic Tool Co., Cleveland, riveting and chipping hammers, air drills and grinders, sand rammers, etc.; Cleveland Steel Tool Co., Cleveland, punches, dies, rivet sets, etc.; Cleveland Twist Drill Co., Cleveland, reception booth; Cochrane-Bly Co., Rochester, N. Y., metal sawing machine, automatic saw sharpening machine, etc.; Commonwealth Steel Co., St. Louis, cast steel car underframes, trucks, pilots, etc.; Covington Machine Co., Covington, Va., hose dismantling and assembling machine; Crosby Steam Gage & Valve Co., Boston, steam gages.

Dale Machinery Co., New York, machine tools; Davis Boring Tool Co., St. Louis, expansion car-wheel and machine-shop boring tools; Dayton Pneumatic Tool Co., Dayton, Ohio, pneumatic tools; Detroit Twist Drill Co., Detroit, drills, reamers and milling cutters; Diamond Machine Co., Providence, R. I., grinding machines; Henry Disston & Sons, Philadelphia, metal-cutting circular saws and metal band-cutting saws; Joseph Dixon Crucible Co., Jersey City, N. J., graphite products; Duff Mfg. Co., Pittsburgh, jacks of all types.

Edgewater Steel Co., Pittsburgh, locomotive tires and rolled steel wheels; Edison Storage Battery Co., Orange, N. J., storage batteries of various types; Electric Arc Cutting & Welding Co., Newark, N. J., rivet-cutting apparatus; Electric Storage Battery Co., Philadelphia, Exide batteries.

J. B. Ford Co., Wyandotte, Mich., metal cleaner; Fort Pitt Malleable Iron Co., Pittsburgh, Pa., freight car and locomotive castings; Fort Pitt Spring & Mfg. Co., Pittsburgh, springs for railroads and industrial companies.

General Electric Co., Schenectady, N. Y., various applications of industrial control apparatus in operation; G. A. Gray Co., Cincinnati, planers; Griffin Wheel Co., Chicago, chilled iron car wheels; Grip Nut Co., Chicago.

Edwin Harrington & Son, Philadelphia, multiple spindle drill; Hartford Tap & Gauge Co., Hartford, Conn., taps, gages, etc.; Heald Machine Co., Worcester, Mass., grinding machines; Hyatt Roller Bearing Co., New York, roller bearings.

Illinois Steel Co., Chicago, track supplies; Independent Pneumatic Tool Co., pneumatic and electric tools; Ingersoll Milling Machine Co., Rockford, Ill., milling machine; Ingersoll-Rand Co., New York, air compressors and other air tools.

Jenkins Brothers, New York, valves and mechanical rubber goods; Johns-Manville, Inc., New York, roofing, building and waterproofing materials; Johnson Bronze Co., New Castle, Pa., brass castings and bronze bushings; Jones & Laughlin Steel Co., Pittsburgh, wire products, tubular products, spikes, etc.

William H. Keller, Inc., Grand Haven, Mich., pneumatic tools; King Pneumatic Tool Co., Chicago, pneumatic and electric tools.

Lehman Machine Co., St. Louis, geared-head lathe; Lewis-Shepard Co., Boston, trucks; Lunkenheimer Co., Cincinnati, valves and other engineering appliances.

McConway & Torley Co., Pittsburgh, car couplers; Manning, Maxwell & Moore, Inc., New York, machine tools and supplies; Metal & Thermit Corporation, Thermit welding; Alexander Milburn Co., Baltimore, acetylene welding and cutting equipment; Morton Mfg. Co., Muskegon Heights, Mich., draw-cut shaper.

National Lock Washer Co., Newark, N. J., car fixtures; National Malleable Castings Co., Cleveland, couplers, journal boxes, etc.; National Tube Co., Pittsburgh, reception booth; Nazel Engineering & Machine Works, Philadelphia, motor-driven air hammer; Newton Machine Tool Works, Philadelphia, crank planing machine, continuous milling machine; Norwalk Iron Works Co., South Norwalk, Conn., air and ammonia compressors; Nuttall Co., Pittsburgh, heat-treated gearing.

George Oldham & Son Co., Baltimore, Md., pneumatic tools.

Page Steel & Wire Co., Bridgeport, Conn., welding rods and electrodes, wire products; Parish & Bingham Corporation, Cleveland, pressed steel car parts; Parkesburg Iron Co., Parkesburg, Pa., charcoal iron boiler tubes; Peerless Machine Co., Racine, Wis., hack saws; Penn Iron & Steel Co., Creighton, Pa., staybolt, engine bolt and double refined iron; Pittsburgh Steel Foundry Co., reception booth; Pittsburgh Testing Laboratory, Pittsburgh, compression machine for testing samples of sand and cement in compression; Porter-Richards Machinery Co., Philadelphia, machine tools; Pressed Steel Car Co., New York, reception booth.

Racine Tool & Machine Co., Racine, Wis., metal cutting machines; Reading Iron Co., Reading, Pa., wrought iron pipe; Reed-Prentice Co., Worcester, Mass., machine tools; Republic Iron & Steel Co., Youngstown, Ohio, reception booth; Rivet Cutting Gun Co., Cincinnati, rivet-cutting guns; John A. Roebling's Sons Co., Trenton, N. J., wire products; Rome Iron Mills, Inc., New York, staybolt and engine bolt iron; Joseph T. Ryerson & Son, machine tools and supplies.

William Sellers & Co., Philadelphia, locomotive injectors, valves and other accessories; Sharon Pressed Steel Co., New York, corrugated car-roof sections; Sherritt & Stoer Co., Philadelphia, machine tools; Simonds Mfg. Co., Fitchburg, Mass., metal-cutting saws; S K F Industries, Inc., New York, ball bearings and steel balls; Southwark Foundry & Machine Co., Philadelphia, washer-cutting press, flue welder, bushing press and other machines; Standard Forgings Co., Chicago, friction-draft gear forged steel yoke, etc.; Stowell Co., South Milwaukee, Wis., door hangers for warehouse and factory doors; Superior Steel Castings Co., steel and malleable iron car castings; Swind Machinery Co., Philadelphia, machine tools.

Union Spring & Mfg. Co., Pittsburgh, reception booth; Universal Boring Machine Co., Hudson, Mass., boring machine.

Vanadium Alloys Steel Co., Latrobe, Pa., high-speed, alloy and carbon steel and tools made therefrom; Vanadium Corporation of America, vanadium steel locomotive forgings.

Walworth Mfg. Co., Boston, wrenches, unions, valves, etc.;

Westinghouse Air Brake Co., Pittsburgh, air compressors, brake cylinder packing cups, friction draft gear, etc.; Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., portable arc welding outfit in operation, turntable equipment, locomotive headlight generator, etc.; Whiting Corporation, Harvey, Ill., locomotive hoist and crane trolley; Williams Tool Corporation, power pipe threading machine with new Williams patent receding die-head; Alan Wood Iron & Steel Co., Philadelphia, special articles made from plates and sheets; Worthington Pump & Machinery Corporation, New York, locomotive feedwater heaters; Wright Mfg. Co., Lisbon, Ohio, chain hoists; Wyoming Shovel Works, scoops.

Yale & Towne Mfg. Co., Stamford, Conn., electric crane truck, chain hoists, etc.

GERMAN WAR PLANTS ACTIVE

Many Already Adjusted to the Manufacture of Peace Time Products

(Special Correspondence)

BERLIN, GERMANY, June 3.—German munition factories of war time are gradually completing arrangements for the manufacture of products of more use. Some of these works have made considerable progress in their new lines, and all report a good stock of orders. Working forces are slowly increasing. The Deutsche Waffen und Munitionsfabriken (Arms and Munition), Berlin-Karlsruhe, has altered its name to Berlin-Karlsruher Industrie Werke A. G. It is now producing aluminum wares, ball-bearings (a pre-war specialty), automobile parts, sporting rifles, bicycles, etc. Part of the works is left to other firms or used as storerooms. At present 5000 workmen are employed. The managers report orders for several months. Gross profits increased to 20.41 million marks (15.09 million marks in 1920). A dividend of 30 per cent is paid. The company holds shares of the Köln-Rottweil A. G. for over 20 million marks. The ammunition factory of Mauser, A. G., in Oberndorff belongs entirely to the Berlin-Karlsruher Werke A. G., and is only allowed to produce, of its old line, sporting guns and small pistols. New manufactures taken up include tools, sewing machines, small motor cars, and writing desks. A dividend of 10 per cent is paid.

The Wurttemberg firms around Friedrichshafen were forced to make the most drastic changes in their products. The plants were adapted solely to the manufacture of airships. The production of large aluminum castings has been taken up. The number of workmen, which was about 500 in 1914, increased to 7000 during the war. About 1600 are employed now. The Maybach Motorenbau has changed from airships to motor car engines. The Daimler Motoren Gesellschaft in Unterturkheim and Sindelfingen, which turned out aeroplane motors and artillery tractors during the war, is making motor cars now. The gross profits amount to 74,132,892 marks (42,290,390 in 1920). The dividend is 10 per cent. The number of employees, which had increased to 18,000 during the war, is 5000 now. The Bosch Metallwerk A. G. Stuttgart (magneto), has started the manufacture of lighting sets and other motor car necessaries, as foreign markets could not be opened up to the old extent. The number of workmen is 5500. Gross profits were 100,380,229 marks in 1921 (47,103,724 marks in 1920). A dividend of 25 per cent is paid. The Swiss business resulted in a loss last year. Trade in the Vienna and Budapest branches continues slack. Export to Italy assumes fair dimensions. To stimulate sales in the northern countries the Aktiebolaget Robo has been formed in Stockholm. A new branch is being opened in Buenos Aires.

The Köln-Rottweil A. G. in Rottweil is making artificial silk (viskose), cartridges for sporting rifles, vulcanized fiber (which is making Germany independent of imports), and a floor and table covering, a substitute for linoleum. The department in Premnitz is also producing carbon bisulphide now. Gross profits amounted to 43,827,940 marks (30,923,777). Dividends were 20 per cent.

The Westdeutsche Sprengstoff A. G. (explosive factory) in Dortmund has started the production of tape for typewriters. The dividend paid for 1921 is 18 per cent. The Sprengstoffabrik Hoppecke A. G. in Cologne has taken up the manufacture of wood screws, electric accumulators, and miners' lamps and reports a fair amount of orders. The company is paying a dividend of 10 per cent. The Rhenish-Westfalian Sprengstoff A. G. in Cologne is producing dynamite and powder for mines and has taken up the manufacture of celluloid and cedulon.

British Empire Steel Plans in Newfoundland

The British Empire Steel Corporation has undertaken to construct a plant capable of producing 100,000 tons of pig iron annually in Newfoundland before 1928. This action is taken following an agreement between the corporation and the Newfoundland Government, the latter having arranged to pay a royalty of 25 cents per gross ton to the British Empire Steel Corporation for every ton of ore that is mined in the colony. The corporation further undertakes to erect coke ovens and to expend $3,000,000 in Newfoundland before 1926. It has been arranged that raw materials to be used in the plant construction are to come in free of duty.

Both subsidiaries of the British Empire Steel Corporation—the Dominion Steel Corporation and the Nova Scotia Steel & Coal Co.—are granted rights regarding tax exemption and water power grants. The royalty of 25 cents per gross ton is to continue in force until December, 1940. In the event of either company's failing to carry out the construction program agreed upon, or failing to expend $3,000,000 in Newfoundland before 1926, an export tax of $1 per ton will be imposed by the Newfoundland Government upon all ore mined and shipped to anywhere except Nova Scotia.

French Pig Iron and Steel Output in 1921

Data as to the pig iron and steel production of France in 1921 have recently been made public by the Comité des Forges of France. The pig iron output was as follows in metric tons:

From blast furnaces	3,361,385
From electric furnaces	55,568
Total	3,416,953

This compares with a total in 1920 of 3,433,791 tons or a decrease of only 16,838 tons. Of the 1921 output, 88 per cent was phosphorus bearing iron (over 1 per cent), 10 per cent hematite iron and 2 per cent other grades. On June 1, 1922, there were on blast 73 blast furnaces out of a total of 220; 64 were in process of construction or rebuilding.

Metric tons of steel by grades in 1921 follow:

Thomas steel	1,779,860
Bessemer steel	45,094
Open-hearth steel	1,243,216
Crucible steel	9,543
Electric steel	24,457
Total	3,102,170

Of this total 3,005,454 tons were ingots and 96,716 tons were steel castings. The total output in 1920 was 3,050,396 tons, making an increase for 1921 of 51,774 tons or 1.7 per cent.

British Pig Iron and Steel Output for May

LONDON, ENGLAND, June 20 (*By Cable*).—The production of pig iron in Great Britain in May was 407,900 gross tons and that of steel ingots and castings 462,300 tons. These compare with an output of 394,300 tons of pig iron and 404,200 tons of steel ingots and castings in April, with 389,800 tons of pig iron and 549,400 tons of steel ingots and castings in March, of 300,100 tons of pig iron and 415,000 tons of steel ingots and castings in February and with 288,000 tons of pig iron and of 327,500 tons of steel in January. (The May pig iron output is the largest since February, 1921, when it was 463,600 tons. The steel output has increased but slightly due probably to the strike in the metal working or so-called engineering trades).

The Competition of German Cheap Labor

In Iron, Steel and Metal Working Industries the Short Day Prevails, but Wages Expressed in Dollars Are Abnormally Low

(Special Correspondence)

BERLIN, GERMANY, June 3.—In the chronic discussion in western Europe and America as to Germany's competitive ability in the steel and machinery branches it is generally asserted that German working hours are much longer than foreign, and that German wages, reckoned in gold or in any high currency, are abnormally low. The first of these statements is incorrect. The second is correct. The facts are as follows:

Hours of Work

The eight-hour day is almost universally in operation as a compulsory maximum. It was proclaimed by provisional revolutionary decree of Nov. 23, 1918. The decree expired on March 31, 1922, but has been prolonged until October, pending the passing of a definite eight-hour bill, which is now before the Reichstag. A bill ratifying the Washington convention of November, 1919, is also before the Reichstag. In coal mining there is a legal maximum seven-hour day. Under labor pressure the Wirth cabinet lately submitted a seven-hour day bill for all underground mining, iron, etc., but this has not been passed; and a later bill, also not yet passed, permits an increase of working time in coal mining under certain circumstances to seven and a half hours. In the iron and steel branches, including smelting, rolling mill, machine, electro-technical and shipbuilding branches, eight hours is never exceeded, with certain exceptions for continuous shift operations. The most general rule is a 46-hour week; and a violent dispute was lately caused in south Germany by the attempt of employers to lengthen this to the legal maximum of 48 hours.

Employees Exceed Eight Hours to Earn More

The statements headed "The 48-Hour Week in Germany," in THE IRON AGE of April 27, 1922, are correct. Working less than 48 hours a week is very common. Breaches of the law in the opposite sense, i.e., working more than eight hours daily, are also fairly common; but they are practically confined to small and isolated country undertakings. The motive here is almost invariably pressure from the employees, not from the employers, who alone are held responsible and alone punished when violation of the law is discovered. The annual reports for 1920 and 1921 of the Prussian, Saxon and Wurttemberg industrial inspectorates state that employers, while in principle against the compulsory maximum eight-hour day, no longer oppose its application. But it is added that workmen, individually and by groups, often demand and even enforce a longer working time. The motive is the workman's desire to increase his earnings. The Wurttemberg official report, for instance, complains that when inspectors attempt to investigate violations of the law the workmen refuse to give evidence and that they generally create difficulties. Many workmen boast that they "will not allow outsiders to dictate to them how long they shall work." Very many workmen, after completing their limit of eight hours with their chief employer, proceed to evening work in other concerns, or start petty workshops of their own. This abuse is so common that the pending eight-hour bill forbids employers to take on men who in other concerns have already done eight hours' work.

In concentrated industrial centers and in large isolated concerns such violations of the law do not take place; and in general a maximum eight-hour day, or from 42 to 48 hours a week, is the rule in the iron, steel and metal-working branches.

How Nominal Wages Have Risen

A bill now before the Reichstag provides for future compiling of a federal wages index. For most trades the most complete wage statistics are at present issued by the labor unions; but for iron and steel there is an official federal index embracing the ten most important centers. The salient facts in this index are: 1. That the nominal (mark) wage has risen enormously, and has in general kept in step with the growing living cost. 2. That the gold (dollar) wage has fallen enormously since 1914. 3. That unskilled workmen have managed to raise their wages much more than skilled. The last is a universal rule in German industry.

The following table shows the average wage for married workmen, who in some towns receive as much as 20 per cent more than unmarried men of the same degree of efficiency. The gold wage in dollars is also shown, as obtained by reckoning 4 marks to the dollar in 1914, and 300 marks for May, 1922. The index figures given show the relation of the growth of wages to the growth of living cost:

	Weekly Wage in Marks		Weekly Wage in Dollars		Index of Wage Rise	Index of Living Cost Rise
	July, 1914	May, 1922	July, 1914	May, 1922		
Skilled workers.....	37.57	957	9.40	3.20	2548	
Half-skilled workers...	33.49	926	8.40	3.10	2765	2673
Unskilled workers.....	25.04	903	6.25	3.00	3606	

Before the war iron and steel employees' wages differed considerably in different localities; and this is true to-day. In 1914 a skilled workman in Berlin earned 42.44 marks weekly, in Cologne 35.64 marks, and in Magdeburg only 29.7 marks. In May, 1922, the respective wages are 1011, 1123 and 689 marks. The decline in the gold wage, the factor which counts in international competition, is very great. It should be noted, however, that the pre-war working week was usually 60 hours, and the present week rather under 48 hours; and this has meant lessened production. The syndicus of Minden Chamber of Commerce, Dr. Hoffmann, prints statistics to show that the all round decline in production caused by the eight-hour day alone (other causes being allowed for) is about 15 per cent.

Other German authorities on wages in the iron and steel trades agree closely with the above. Labor union statistics from 222 towns showed that at the end of 1921 wages of unskilled workmen in all kinds of metal industries had risen on an average 20.40 fold since 1914, and of skilled workmen 16.74 fold. At that time the cost of living (Federal index) had risen only 15.50 fold, so that both classes had higher real wages than before the war. Cost of living and wages have since then risen very much, and are still rising; and owing to the recent relative stability of the mark exchange, the gold wage has increased. Extremely small as this gold wage now is, it is much higher than in early November, 1921, when the mark exchange was somewhat lower than now, but when paper-mark wages were between half and two-thirds of the present.

Thus the average metal-worker's wage in Frankfurt-on-Main in November was only 8.30 marks an hour, which at the then prevailing exchange of around 300 marks to the dollar, was less than 3 cents an hour. At about the same date the skilled workman's wage in the Augsburg-Nurnberg Engineering Co.'s shops was exactly 2.65 cents an hour, at the Deutsch Luxemburg (Stinnes) blast furnaces, 2.5 cents, and in the Ernemann-Krupp works at Dresden, 3.5 cents. These rates no longer apply; but, as the above table shows, even the present wage per week is much lower than is paid to an American workman of similar qualifications for a single day. Naturally in these circumstances the shortness of the working day plays no role in weakening Germany's ability to compete.

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ESTABLISHED 1855

THE IRON AGE

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Another Strike Failure

Little surprise and much less concern is created by the newspaper statements of the railroad labor union heads that the overwhelming sentiment of the workers affected is in favor of striking against the July 1 wage reductions. The public remembers the whole performance as it was gone through with last October and refuses to be alarmed. It hears from President Lewis, of the United Mine Workers, that "a strike of 1,000,000 or more railroaders would cause such a dislocation of all industry that the country would soon be prostrated and the railroad and mine corporations would come to terms with their workers," and still is unwilling to see a serious situation ahead. Much greater threatenings were breathed out eight months ago, when the "big four" set out to tie up the country, but no men anywhere were more relieved than the railroad union chiefs when the Railroad Labor Board found them a way to call off the strike.

The public has been shown over and over how far railroad wages are above the rates of 1915 and how railroad workers have escaped the reductions in income that have affected workers in nearly every other line, as well as thousands of small owners of securities. It will not be misled, therefore, by the cry now raised that the reductions to take effect July 1 will bring the pay of the men affected below a "living wage." The facts and figures put into the record at the Railroad Labor Board hearings and at the Washington hearings in April before the Senate Interstate Commerce Committee have not been successfully challenged and cannot be. Take the Labor Board's finding of May 28, which reduced maintenance of way employees and railroad shop laborers, and what does it show as to the increase in wages of so-called common labor as compared with the increase in cost of living? The wages taken as base were those prevailing in December, 1917, when average hourly rates were 19.3 cents. At high point under Government control the hourly rate was 46.3 cents; in July, 1921, it was 37.7 cents and on July 1 next it will be 32.7 cents. Thus on July 1 the average common labor wage will be 69.4 per cent above that of December, 1917. The cost of living, computed for March, 1922, the latest Government data, is but 17.2 per cent over that of December, 1917.

Taking section gang workers, who make up largely the common labor of the roadbeds, and their average monthly pay to-day, $98.88, is 124 per cent above that of 1915, which was $44.17. Compare this with common labor in the steel industry, which at 30 cents per hour, the highest to-day, is 50 per cent above that of 1915. In a good many cases only 25 cents per hour is paid to-day for common labor at iron and steel works, or only 25 per cent above the level of 1915. The increase for railroad common labor, even after the reduction of July 1, would thus be five times as much as at a number of iron and steel plants. As is well known, skilled railroad workers, those belonging to the four brotherhoods which control train operation, have a much greater percentage margin over the cost of living, compared with the margin they had in 1915, than that shown above for common labor.

It was the failure of the brotherhoods to get public support that forced the calling off of the strike of last fall—that and the firm stand of the Attorney General, who let it be known that he would use his authority to the utmost to prevent any strike order from being carried out. There is no sign that either the public or the Attorney General will think better of the strike now being agitated than of the one threatened in October, 1921. When all other classes in the community, with the conspicuous exception of coal miners and the building trades unions, have borne severe reductions in income they are not going to support railroad employees in an effort to make the public pay for transportation at substantially war-time prices.

It was testified before the Senate Interstate Commerce Committee by C. S. Duncan, an economist, that "the vast wage bill of $3,698,216,351 was actually paid to railroad employees in 1920." According to equally reliable statistics, the total receipts of the railroads from all sources in 1916—only four years previous—were $3,381,597,000, or $300,000,000 less than the labor bill of 1920. And in 1915 the total receipts were only $2,805,-

000,000. The people know, doubtless better than they know any other of the main economic facts in the present situation, that high railroad wages have prevented the reduction they had a right to expect in the transportation bills fastened on them by the war. How futile, then, is the attempt to raise the issue of a "living wage." Moreover, in linking up with the unpopular strike of the coal miners, which likewise is aimed at the public welfare, the railroad workers seem more to be taking counsel of desperation than of intelligent strategy.

What the Public Pays For

Every one of reasonable intelligence recognizes that strikes are costly affairs. How the cost is paid, however, as for instance in the case of the coal strike, is a matter on which opinions may differ. The executive department of the United States Government is engaged in an effort to hold down the price of non-union mined coal, and this directs attention to the fact that when there is a strike the public is likely to have to pay extra prices for the goods or services involved. The extra price is a direct loss to the purchaser, but it is not necessarily an economic loss, and if it is not the latter it is not necessarily a loss to the country as a whole, or to society.

In a trolley strike, for example, if a man pays 25 cents for an automobile ride instead of 5 cents for a trolley ride, his personal loss is 20 cents, but the economic loss lies in the fact that more work is involved in transporting him by automobile than by trolley. There is a consumption of gasoline and tires, a depreciation in the equipment and an employment of driver's services, amounting to more than the cost of transportation by trolley.

In this coal strike the extra prices paid by coal consumers are a loss to the consumers, but only part of this is an economic loss. When coal is poorly mined, as is the case with some non-union coal nowadays, with slate and other inclusions resulting in high ash, there is an economic loss. When the coal has to be transported unusual distances there is an economic loss. The railroads are made to do work that would not be necessary were there no strike.

These economic losses are small compared with the economic loss of several hundred thousand men being idle. These men are consuming while they do not produce. It is merely a detail of little if any economic importance, whether they live by their savings, by store credit or by begging. The important thing is that a large number of men are consuming and not producing. That is something the public must pay for in the long run.

The country is full of economic losses occurring through men not doing as much work as they could reasonably be expected to do, although they endeavor to obtain a certain income, which being spent represents the goods and services, furnished by society, which they consume. There are economic losses when men go on strike, as the coal miners do so frequently; when men do less than a fair day's work, as is the case with many carpenters, bricklayers and other artisans, and when lines between trades are drawn so that certain artisans have to be hired when others could more conveniently do the work.

Observance of this particular class of losses suggests that a direct and quantitative study might well be made of them. The public has come to realize that it does pay for these losses, but it does not know just how much it pays. It is aroused because its pocket nerve has been touched, but it has no definite measure of the pain. In these days of quantitative studies in economics we have studies of the wealth of the country and of the income of the country. Why not summarize with equal precision these economic losses?

American and British Cast Iron

The effect of blast pressure, temperature and operating speed on the quality of foundry pig irons was the most interesting of the various comparisons of British and American gray irons in the international exchange paper read at the Rochester convention of foundrymen two weeks ago. A full abstract of the paper appeared in THE IRON AGE, June 15, and on other pages of this issue are reports of two valuable discussions. The British author, in asserting the superiority of British pig irons, made some claims to which courteous but emphatic exceptions were taken. The effect of blast furnace practice, however, was recognized as vital.

That the slower running British furnaces produce generally a better iron, one at least less oxidized, was admitted by one speaker, but it is also to be said that there are American furnaces which turn out the equivalent of the best foundry iron made anywhere. American foundry iron furnaces are, as a rule, larger than those in Great Britain and it is possible that the size of the charges also has some effect on the quality. It is certain that the character of the charge plays an important part. American blast furnace operators use more scrap, both iron and steel, than the British—and the scrap percentage increases under present fuel conditions. However, the effect of this mixture on the quality of foundry irons is not a settled question.

The old problem of the effect of oxygen came up in the discussion and again was left a problem. The British author explained the alleged superiority of British iron as due to the freedom from oxidizing conditions secured by slow running, resulting in a superior "cohesional strength." One American metallurgist brought up the contrary theory of the late J. E. Johnson that the slow operating cold blast charcoal furnace produces a high grade of iron because oxygenation gives more compactness of grain formation. Undoubtedly extensive research is necessary to solve this problem.

There are marked differences in operating methods at blast furnaces in the two countries. They may be responsible in some degree for variations in quality. But beyond a doubt good iron can be produced on a large scale in the blast furnace, just as quality steel can be produced in quantity in large open-hearth furnaces. The

question raised by the paper of the British guest at the Rochester convention largely turns on the use to which the iron is to be put. "Good" and "bad" are relative terms as applied to pig iron. Much depends on the character of the casting that is to be produced and on the skill of the user in making cupola mixtures that will give the maximum of the desired properties in the casting. It is quite well established that chemical analysis does not tell the whole story of the physical results to be expected from mixing certain pig irons in varying percentages. Thus a wide field has been opened up for speculation on the effect of diverse handling of the blast furnace. Thus, too, it was natural that from the British standpoint a virtue should be made of the slow life and the relatively small output of British blast furnaces. But should it ever come to pass that the operators of these furnaces are able to approach American standards in output, it is to be doubted that that achievement would be accompanied by the admission that the product was inferior.

Sulphur in Rivet Steel

A first impression from reading the initial report of the joint committee to investigate phosphorus and sulphur in steel, as abstracted elsewhere from the advance printing by the American Society for Testing Materials, is that of the stupendous character of the work. The report covers only sulphur in rivet steel, but represents thousands of chemical and physical tests. It has back of it the authority of 16 prominent scientists representing 11 leading technical and commercial organizations. The disappointing feature is that no conclusions are drawn. The consensus of opinion of the investigators would have carried weight.

The report calls to mind the paper of Dr. John S. Unger, "High and Low Sulphur in Basic Steel," read before the Society of Automotive Engineers in January, 1916, and published in THE IRON AGE Jan. 13, 1916. His was a similar investigation on a smaller scale, covering basic open-hearth steel with a range of sulphur from 0.025 to 0.23 per cent in channels, rivets, forgings, chain, etc. His comments were received with some amazement at the time and yet many of his results were strikingly similar to what appear in the later report. Dr. Unger held that a steel containing around 0.10 per cent in sulphur is not necessarily bad and that it will show little difference in quality when compared with the same steel of much lower sulphur, other conditions being the same.

One interesting result of the committee's report is that the plotted curves of physical results show very little variation with a sulphur content above 0.07 to 0.08 per cent, with the exception of the impact tests, in which there are sharp declines as the sulphur increases. There is some confusion, however, as to which impact test is most reliable. The variation in the manganese content of the heats is regrettable as introducing a factor of possible large influence upon the results.

The conclusion may fairly be drawn from the report that high sulphur, even up to 0.18 per cent, is not so harmful as many metallurgists and specification framers have insisted. The sulphur problem is still with us, but a vast amount of new information has been supplied, in the light of which the formal discussion at the meeting of the American Society for Testing Materials next week will no doubt prove of first-class value to makers and users of steel for construction.

Steel Demand in a Lean Year

As the production of finished rolled iron and steel in 1921 was only 45 or 46 per cent of the output in the three greatest tonnage years, 1916 and 1917, war years, and 1920, a post-war year, it would appear that the distribution of the material in the different products would furnish a very good index to the character of demand in a lean year. The only difficulty about such a study is that the very light production in 1921 was due in part to the liquidation of stocks previously accumulated, so that the production in 1921 was not in exact relation to the actual consumption. The stocks at the beginning of 1921 were partly in rolled products in the hands of jobbers and manufacturing consumers and partly in the form of manufactured wares, such as agricultural implements, for instance.

There was no uniformity in this matter of stocks at the beginning of 1921. Undoubtedly there were much greater stocks of plates, for instance, than of structural shapes. Then as to tin plate, the stocks were light, but the stocks of goods in tin plate containers were large.

Some interesting comparisons, however, can be made. It is of practical interest to look for products that present the appearance of being what is called "staple" in character. Pre-eminent in this respect is the wire nail. The production in 1921 was 11,889,412 kegs, exports being 629,650 kegs, leaving 11,259,762 kegs for domestic consumption, which is only 23 per cent under the record, made in 1917, against a decline in rolled products generally of about 55 per cent. The stability of nail demand is emphasized by the fact that in 18 years the production minus exports has ranged only between 10,055,158 kegs in 1905 and 14,466,612 kegs in 1917. It is of particular interest to note that over a long period the per capita consumption of nails has, if anything, decreased. Taking cut and wire nails together, the annual consumption in 1890 and adjacent years was about 14 pounds, while in the past three years it has been about 12 pounds.

Demand for welded tubular goods held up relatively well in 1921, the production of standard pipe, oil country goods, boiler tubes, etc., being 1,987,442 gross tons, which was 66 per cent of the record, made in 1920, and 75 per cent of the output in 1916, the next best year. This comparative steadiness of demand was not due to the widely different uses to which pipe is put, for merchant pipe and oil country goods have fluctuated in demand in much the same way. Seamless tubes, on the other hand, have shown great variations, the production rising from 108,567 tons in 1913

to about 252,000 tons in both 1918 and 1920 and then dropping to 117,884 tons in 1921. The backset was almost 60 per cent, but on the other hand 1921 saw a greater tonnage than 1913, while in rolled iron and steel products generally 1921 was only 60 per cent of 1913.

There has been an increase of about 50 per cent in steel making capacity since the end of 1913, while the last census showed the increase in population in a decade to have been only about 15 per cent, while the increase in the number of persons gainfully occupied was only about 10 per cent. An interesting question, therefore, is whether consumption per capita has tended to increase, by the development of new uses for steel products. The statistics furnish some hints in this connection. It is well recognized that 1913 was a good year industrially, while 1921 was a poor year, although there is no general measure of just how poor it was. We have the fact that rolled iron and steel production was 40 per cent less in 1921 than in 1913, and that is one sort of measure. Then we find that the production of galvanized sheets decreased by 26 per cent from 1913 to 1921, and production of sheet wares formed and then galvanized decreased by 15 per cent; but deducting the black sheets thus involved we find that the remaining black sheets increased by 15 per cent. Seamless tubes increased 9 per cent. When such gains can occur in an "off" year the case of a "good" year is very hopeful.

With all the excellence and variety of the 16 technical papers and reports at the gray iron sessions of the foundrymen's convention at Rochester, there was no paper on the developments that have been coming so rapidly in electric gray iron castings. So much has been accomplished by the use of the electric furnace in the iron foundry that the American Electrochemical Society conducted an epoch-making symposium on the subject at its Baltimore convention in April. But it can hardly be said that that discussion brought out the last word or that it represented adequately the viewpoint of the producer of castings. It is to be hoped, therefore, that at their convention in 1923 the foundrymen will devote a session to the performance and the further possibilities of the electric furnace, particularly in yielding a high grade iron, desulphurized, degasified and superheated.

The success of the first E. A. Karelsen prize essay competition on "What Can a Man Afford?" has moved the donor to make it possible for the American Economic Association to conduct a second competition. The subject for the essays of the second competition is "The Relations of Capital and Labor." The prizes offered for the most meritorious essays: First prize, $1,000; second prize, $500; third prize, $250. Essays are to be submitted in typewritten form before Sept. 1 to the secretary of the American Economic Association, Yale Station, New Haven, Conn., from whom full details as to the competition can be obtained.

The secretary's report at the annual convention of the American Federation of Labor at Cincinnati last week showed that the membership had decreased by 710,893 since the Denver convention of 1921, the membership to-day being given as 3,195,635. The peak was 4,078,740 in 1920.

REFRACTORIES SITUATION

May Production of Fire Clay and Silica Bricks Higher Than That of April

The monthly statistical chart issued by the Refractories Manufacturers' Association, Oliver Building, Pittsburgh, shows that production of fire clay brick increased in May to 59 per cent of economical producing capacity, while shipments increased to 56 per cent. Stocks on hand on May 31 stood at 193 per cent, about the same as on April 30. New orders for fire clay brick showed an upward tendency in May, totalling 65 per cent of economical producing capacity. Unfilled orders on May 31 were 58 per cent.

In silica brick, the chart shows a marked increase in May over April, plants reporting showing a production of 45 per cent of economical producing capacity, the highest in any one month since December, 1920. Shipments stood at 39 per cent in May, as compared with 38 per cent in April. Stocks on hand on May 31, were 138 per cent as compared with 133 per cent on April 30. New orders for silica brick in May showed a decided falling off, being only 39 per cent as compared with 50 per cent in April. Unfilled orders showed no change, remaining at 55 per cent.

A monthly meeting of the Refractories Manufacturers' Association will be held on Wednesday and Thursday, June 28 and 29, at the Hotel Traymore, Atlantic City, N. J. At this meeting, most of the manufacturers of refractories are expected to be present, and it is likely some of the mergers now pending among refractories manufacturers will be concluded at the meeting. The General Refractories Co. has taken over the plants and assets of the Pennsylvania Fire Brick Co., whose works are located at Beech Creek, Pa. The price was $191 per share for the stock of the company, $100 per share being par value.

Demand for refractories of various kinds remains fairly active with prices unchanged from those given on page 1681 of THE IRON AGE of June 15.

Several large orders have lately been placed for fire brick for blast furnace relining, and other business of this nature is in sight.

Blast Furnace Properties Combined

The Reliance Coke & Furnace Co., Frick Building, Pittsburgh, has taken out a Pennsylvania charter with a capital of $2,400,000 and has acquired the properties of the Reliance Coke Co., which owns 236 Belgian type ovens at Denbo, Washington County, Pa., the Claire Furnace Co., owner of Claire blast furnace at Sharpsville, Pa., and Ella Furnace Co., owner of Ella blast furnace at West Middlesex, Pa. These three companies are interests of E. W. Mudge & Co., Frick Building, Pittsburgh.

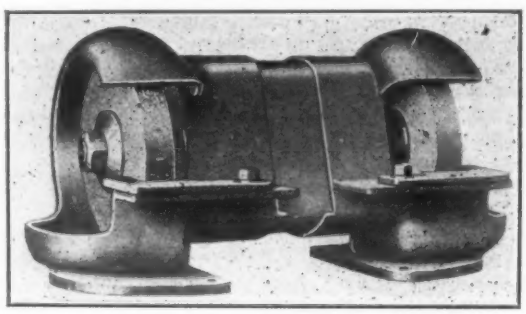
Officials of the Reliance Coke & Furnace Co. are: E. W. Mudge, president; C. B. Ferree, vice-president and treasurer, and R. D. Campbell, secretary. E. W. Mudge & Co., who have been general selling agents for the three companies named will continue to act in that capacity for the combined interests. Claire furnace was rebuilt last year, being considerably enlarged, and at present three new stoves 22 x 100 ft. are being built at the furnace to replace three old stoves which will not be torn down for the present. Freyn, Brassert & Co., furnace engineers, Chicago, are engineers for the work and are erecting the three stoves. A new pump house is also being built to contain two De Laval centrifugal turbo-driven pumps, each with a capacity of 6,000,000 gal. of water per day. Only one of these pumps will be in service, the other being used as a spare. It is expected to have these additions completed about September, at which time the stack will be blown in if conditions warrant.

All of the plants of the Westinghouse Electric & Mfg. Co., East Pittsburgh, are now running at practically 100 per cent of capacity. Owing to the great demand for radio supplies, and also for certain electrical appliances, several departments are running night turn.

New Motor-Driven Tool Grinder

A No. 76 electric tool grinder, with the front of the motor cut back as shown in the accompanying illustration, has been placed on the market by Forbes & Myers, Worcester, Mass.

The grinder illustrated has a squirrel-cage induction motor designed with the windings on the back side of the motor only. The possibility of this construction has been generally known but it is thought by the makers that this is the first time the details of the winding have been worked out so as to make it a commercial machine, including the compensation necessary to avoid undue heating, and to obtain satisfactory starting qualities. This winding permits a design of machine in which the 6 in. wheels project 1¼ in. further forward than the front of the motor, thus making it possible



The Wheels Project 1¾ In. Farther Forward Than the Motor

to wear down three-fourths of the abrasive material before the wheel is even with the motor. It also permits grinding on both sides of the wheel as well as the face and both wheels can be used simultaneously on long work.

The grinder is fully guarded, as shown. Tool rests are of steel, flat and adjustable in two directions. The spindle is ¾ in. in diameter at the wheel and the wheels are 6 by 1 in., with wheel flanges of 2¾ in. in diameter, bearing at the outer edge only. The motor and bearings are fully inclosed, eliminating trouble from dust and grit. The speed is 3600 r.p.m. The motor gives ½ hp.

The machine can be equipped for use on two or three phase, 60 cycle current and for 110, 220, 440 or 550 volts. A similar machine for 110 volts single-phase current is in progress of development.

Pittsburgh Basing Point Case Closed at Chicago

CHICAGO, June 17.—The local hearing on the Pittsburgh basing point for finished steel prices which has been in progress almost continuously for three months was closed to-day. Beginning June 26, the Federal Trade Commission will resume the taking of testimony at Chattanooga, Tenn. On Wednesday and Thursday of the past week the commission held a brief hearing at Duluth, where a number of witnesses, including V. L. Andrew, president Duplex Mfg. Co., Superior, Wis., and Otto Swanstrom, president Diamond Horseshoe Co., Duluth, presented testimony to show how their markets were restricted through the operation of "Pittsburgh plus." Testimony was also introduced contending that steel is manufactured at Gary and Birmingham at 25 per cent less than at Pittsburgh. Substantiation of this contention was sought by quoting from an address by Judge Gary at Duluth in 1918. That Duluth could manufacture steel as cheaply as other steel centers was a contention of Mr. Swanstrom. If Pittsburgh plus were eliminated in the sale of steel in Duluth, he asserted, enough steel could be sold in the district to keep a much expanded local producing capacity engaged.

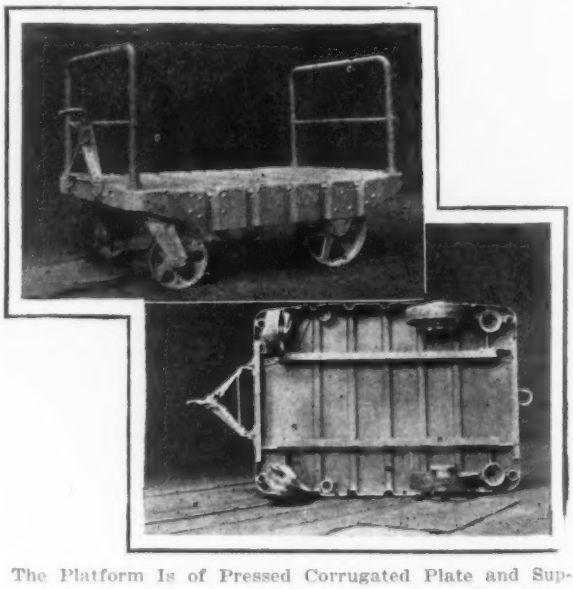
A feature of the testimony at Chicago after the return of the commission to this city was the submittal of testimony by W. A. Lynn, purchasing agent Chicago, Milwaukee & St. Paul Railroad, and E. G. Walker, purchasing department Atchison, Topeka & Santa Fe Railroad, reciting the amount of money expended by each road annually for the "Pittsburgh plus" charge, the figure given for the St. Paul being $40,000 and for the Santa Fe $49,000.

The last witness at Chicago was James R. Howard, Clemons, Iowa, president American Farm Bureau Federation. He stated that his organization had a membership of over 1,250,000 farmers and that the statistical department of the federation, under his direction, had prepared figures concerning the use of steel on the average mid-Western farm. These statistics covered the farms of eleven States, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North and South Dakota, Nebraska and Kansas. The average steel consumption per farm in agricultural implements alone was computed at 2015 lb., and this was increased materially by numerous articles of steel also used on the farms which cannot be classified as implements. Basing his estimates on the freight surcharge of $7.60 per ton from Pittsburgh to Chicago, $6.60 from Pittsburgh to Moline, Ill., (the difference between the through rate from Pittsburgh to Moline and the rate from Chicago to Moline) and $6.50 from Pittsburgh to Racine, Wis., the principal points of agricultural implement manufacture, Mr. Howard estimated the annual cost of the "Pittsburgh plus" to the farmers at $25,000,000 to $30,000,000 for farm implements alone.

Wheeled Platform Trailer

The Elwell-Parker Electric Co., Cleveland, has brought out a wheeled platform trailer built especially for interchangeable use with its elevating platform trucks and tractors, and designed for use as a lift platform as well as a trailer. The trailer is of strong construction but light in weight, weighing 600 lb. and with a carrying capacity of 6000 lb.

The platform is of pressed corrugated steel plate, with deep aprons on each side. It is supported on two heavy longitudinal channels and the corners are protected by malleable castings. The trailer is regularly equipped with two wheels and two casters, but when desired it will be supplied with four casters. Two long steel caster fork pillars carry graphite bushed bearings



The Platform Is of Pressed Corrugated Plate and Supported on Two Longitudinal Channels as Shown

in the upper ends. The ball swivel bearings and roller caster wheel bearings are located in deep recesses in the malleable corner castings. Fixed wheels on roller bearings are carried in forged steel yokes riveted to the top and side. The casters are 10 in. in diameter and the fixed wheels 15 in. in diameter. When desired the wheels and casters will be equipped with solid rubber pressed-on tires. End or side standards with couplers are provided. When used with trailers the unit is furnished with hook and eye or Y or X chain couplers.

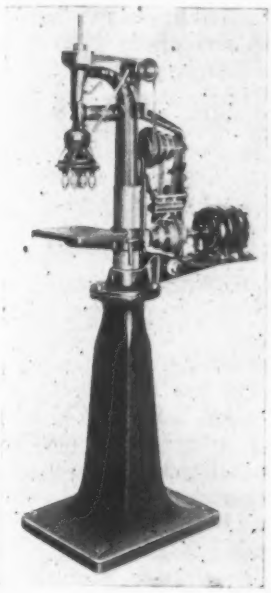
Sufficient clearance is provided between the wheels so that a lift truck platform may be driven beneath. When the lift truck raises the load the weight is supported on the truck platform by the two longitudinal channels beneath the wheeled platform.

Sensitive Multiple Drilling Machine

A new sensitive multiple drilling and tapping machine constructed as shown in the illustration has been brought out by the Landau Machine & Drill Press Co., 45 West Eighteenth Street, New York. The multiple spindle head employed is shown in a separate illustration.

In this design each spindle is instantly converted for either drilling or tapping. After being used for drilling, the drill is removed, a tap inserted, a set screw released and the machine is ready for tapping. Each spindle is a complete unit, and may be used individually, with the remaining spindles idle.

The main-drive spindle is centrally located as shown and mounted in ball bearings which absorb the full load capacity of the entire head. Each spindle is equipped with upper and lower thrust bearings and is



Sensitive Multiple Drilling and Tapping Machine. The view above is of the multiple spindle head

fully and readily adjustable both radially and vertically. The spindle arms are said to be triple the strength required for the capacity of the drilling spindle.

The weight of the head is only 8 lb., which, it is pointed out, makes it suitable for the small work for which the machine is designed. All operating parts are of nickel steel, hardened and ground to accurate dimensions and moving parts are protected by a ventilated hood which acts as a guard. The feed of the head is operated by a rack and pinion and is counterbalanced to make it very sensitive. The travel of the multiple head is 3½ in.

The machine is of quick-change type for low and high speed, the desired speed being obtained without jar by operating the shift lever. Speeds of 500, 900 and 1800 are provided for drilling and for withdrawing the taps, speeds of 600, 1000 and 1800 are available. One cone pulley is mounted in ball bearings on an eccentric shaft. Slack of the upper belt can be taken up readily by turning the eccentric shaft part of a revolution. An idler roller is provided to take up the slack of the lower belt when the speed is changed, and also automatically exert the proper amount of tension at all loads.

The machine is driven either by a ½ hp. motor or by tight and loose pulleys. The drilling capacity is up to ¼ in. and the tapping capacity up to No. 10 by 32. The spread of the spindles is 4½ in. maximum.

The table is 10 by 12 in. and has a vertical travel of 9 in. The distance from the center of the spindle to the column is 8 in. The floor space required is 20 by 34 in. for the floor type machine with motor, and 20 by 26 for the belt-driven. The height, with the column is 60 in. and without it, 30 in. The weights are 360 lb. and 300 lb., for the motor and the belt driven machines respectively.

It is claimed that the work produced in an 8-hr. day is 8000 holes in a cast-iron plate ½ in. thick.

Ferrochromium and Tungsten Alloy Duties Unchanged—Tin Free

WASHINGTON, June 20.—Tariff duties on ferrotungsten, ferrochromium, chromium tungsten, tungsten nickel and other alloys of tungsten, carried in paragraph 302, have been left unchanged at 60c. per lb. on the tungsten content and 25 per cent ad valorem. These were the duties originally reported by the Senate Committee on Finance and were agreed to by the Senate after Senator Smoot, a member of the committee, abandoned his previous suggestion that these duties might be reduced, following numerous complaints coming from tool steel manufacturers. The Senator said that he had concluded not to attempt to make any change because the duty on tungsten ore had been left unchanged at 45c. per lb. on the metallic tungsten.

The Senate also agreed to the action of the Committee on Finance in striking tin bars, blocks, or pigs, and scrap tin from the dutiable list. The House had provided a duty of 2c. per lb. on tin.

Aside from the foregoing and a few minor changes the Senate made no further progress on the metal schedule, but a few paragraphs still remain to be agreed upon.

Coal Production Checked by Car Congestion

WASHINGTON, June 20.—Serious congestion of railroad yards and sidings, in certain districts of southeastern Kentucky, began to interfere with the placement of empty cars at the mines last Wednesday and in consequence the view is expressed by the U. S. Geological Survey that the total output of bituminous coal for the eleventh week (June 12-17) of the strike, will not exceed the 5,000,000 ton mark. Production during the tenth week totaled 5,078,000 tons. There has been little change in the number of men on strike.

Production of by-product coke increased sharply during May. The total output for the month was 2,537,000 net tons, an increase over the revised figure for April of 329,000 tons.

The by-product plants of the country operated at 69 per cent of capacity during the month. Of the 71 plants in existence, 58 were active and 13 idle. One plant which had not been making coke in recent months resumed operations, but another which had been active became idle.

Standardizing Wood Screws

On May 12, a conference for the purpose of standardizing wood screws was called by the Department of Commerce and held at the Bureau of Standards. Eight of the largest wood screw manufacturers in the United States were represented. A standard method of measuring lengths together with a standard list of numbers, diameters, tolerance in diameters, pitches, tolerance in pitch, lengths, tolerance in length, and the proportional length to be threaded were adopted. Flat, round, and oval heads were designated as standards.

The method of measuring length which was adopted may be stated as follows: The length of all kinds of screws shall be measured from the largest diameter of the bearing surface of the head to the extreme end (measured parallel to the axis).

Several departments of the American Bridge Co. will be moved on June 24 to the Empire Building, 71 Broadway, New York. Included is the department of Vice-President Joshua A. Hatfield. Others are the chief engineer's department (C. W. Bryan, chief engineer, C. G. Emil Larsson, J. H. Edwards and O. E. Hovey, assistant chief engineers, and L. H. Shoemaker, assistant to chief engineer) Eastern division contracting department (A. L. Davis, division contracting manager, E. B. Stearns, assistant division contracting manager, B. P. Talbot, J. F. Geoghegan, W. M. White, and J. C. Walker, contracting managers), and the treasury department, L. L. Sisson, credit manager. For the present other departments will remain at 30 Church Street, New York.

Iron and Steel Markets

COAL UNCERTAINTY GROWS

Upward Price Tendency Accented With More Mill Congestion

Threatened Railroad Strike Not a Market Factor—Foreign Pig Iron Arriving

The uncertainties of the coal situation figure more largely in the steel industry this week than at any time since April 1. The upward tendency of prices is accented and the steel trade is more alert for developments indicating a new stage in the contest.

The threat of a railroad strike has not actually entered into the calculations of producers or consumers of steel as yet, but it is recognized that in the event of Government action to maintain transportation there would be stronger pressure for Federal interference to end the coal strike.

Both makers and users of pig iron and steel products are declining to speculate on the future of the fuel situation and to that fact is due a somewhat lessened volume of new buying. Mills generally are sold for some weeks ahead, and in the main buyers are provided for well into the third quarter. It is the moderate and natural run of early delivery needs on which price advances occur.

An increase of a few thousand tons of coal in a week and the starting of 350 Frick coke ovens in the Uniontown district is the net change in the Connellsville situation, but it is not significant. The Steel Corporation maintains ingot output at two to three points above 75 per cent. The average of all steel works operations in the Pittsburgh and Youngstown districts is between 70 and 75 per cent.

More is heard of labor scarcity at Central Western steel plants and rolling mills, particularly at sheet mills, where the shortage is not only in common labor but in heaters and rollers.

Some Central Western mills have fallen farther behind on deliveries of bars, plates and shapes. There are indications that the minimum of 1.60c., Pittsburgh, on bars, plates and shapes, and that only on extended deliveries, will be advanced to 1.70c. from July 1.

The cotton tie season will open early in July, but the basis of prices has not yet been announced.

A 5 per cent advance is expected shortly in the prices of steel castings.

Over 5500 railroad car and car body purchases came to light in the past week and contracts were closed for the repairs to 6000 cars.

The week's business in fabricated steel was fully 30,000 tons in sizeable projects, not including 18,000 tons for oil tanks for the Sinclair company. The May total proved larger than expected, amounting to 82 per cent of the country's capacity and greater than any May record.

In the extension of the American Sheet & Tin Plate Co.'s current prices on sheets to cover August and September, as well as July, the expected has happened, in line with the Steel Corporation's policy, as shown in other products, to hold the situation in check.

Buyers of foundry pig iron have been getting along on small shipments lately in view of the freight reduction of July 1. The stiffening of prices continues, Philadelphia, Chicago and Buffalo reporting a 50-cent advance on very moderate business. More makers are willing to do business reaching into fourth quarter. Several thousand tons of Middlesbrough and Scotch irons will arrive at Atlantic ports this month and about 3000 tons of French foundry iron is to follow.

The tightening of the ferromanganese situation is indicated in the fact that domestic makers have bought some of the British product and are inquiring for additional quantities. Consumers also are buying in lots of 500 to 1000 tons and there is an evident effort to get deliveries before the new high duty goes into effect. In some cases sales of foreign ferromanganese have been made with the stipulation that the buyer pay any duty that may be in effect at the time of delivery.

Lower prices and easier credit arrangements are diverting world business from the United States. An order for 1500 tons of steel bars was lost to Europe at a price delivered in Buenos Aires $7 below the American quotation. Canadian purchases of Welsh tin plate for four months are nearly three times those of the American product, quite reversing the ratio of pre-war times.

British iron and steel exports for May were 272,437 gross tons, which compares with an average of 268,890 tons in the four preceding months. American exports for the same four months averaged 175,640 tons.

Steel rails have been booked by Great Britain for Victoria, 5000 tons, for the Bengal-Nagpur Railroad in India, 8500 tons, and for Siam, 10,000 tons. The South Manchurian Railway is again in the market, this time for 40 miles of 100-lb. rails, or about 6300 tons.

Pittsburgh

Prices Strong Under Active Demand and Continuing Strike Obstacles—Labor Scarcity

PITTSBURGH, June 20.

The belief here is that if the threatened railroad strike occurs the coal strike might continue for several months. The attitude of the coal miners in refusing to return to work at the reduction in the scale of about 35 per cent, offered by the coal operators, seems stronger to-day than it was a month ago. There have been no serious breaks in the ranks of the coal miners, the number of men returning to work being much smaller than expected. No attempts have been made thus far to import new men and some of the leading coal operators who have non-union mines are known to be strongly opposed to any action of this kind. In the meantime, furnace coke is getting scarcer, and it is stated, sold here on Tuesday at $7.25 at oven. This, however, was an emergency case, the buyer being compelled to buy the coke.

The local situation in the steel trade is steady and prices are strong. The average rate of operation of steel works in the Pittsburgh district is 70 to 75 per cent, with the Carnegie Steel Co. about 80 per cent.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	June 20, 1922	June 13, 1922	May 23, 1922	June 21, 1921
No. 2X, Philadelphia‡	**$27.32**	$26.82	$26.26	$25.50
No. 2, Valley furnace†	24.00	24.00	24.00	21.50
No. 2, Southern, Cin'ti†	23.00	23.00	22.50	26.50
No. 2, Birmingham, Ala.†	18.50	18.50	18.00	22.00
No. 2 foundry, Chicago*	**23.50**	23.00	23.00	20.50
Basic, del'd, eastern Pa	25 00	25.00	24.00	25.00
Basic, Valley furnace	25.00	25.00	25.00	20.50
Valley Bessemer, del. P'gh	26.96	26.96	26.96	24.46
Malleable, Chicago*	**23.50**	23.00	23.00	20.50
Malleable, Valley	24.50	24.50	24.50	22.50
Gray forge, Pittsburgh	25.46	25.46	25.46	22.96
L. S. charcoal, Chicago	29.00	29.00	29.00	37.50
Ferromanganese, del. seab'd	67.50	67.50	65.00	70.00
Rails, Billets, etc., Per Gross Ton:				
O.-h. rails, heavy, at mill	$40.00	$40.00	$40.00	$47.00
Bess. billets, Pittsburgh	35.00	35.00	35.00	37.00
O.-h. billets, Pittsburgh	35.00	35.00	35.00	37.00
O.-h. sheet bars, P'gh.	35.00	35.00	35.00	39.00
Forging billets, base, P'gh	40.00	40.00	38.00	42.00
O.-h. billets, Phila	40.74	40.74	40.77	42.74
Wire rods, Pittsburgh	38.00	38.00	38.00	48.00
	Cents	Cents	Cents	Cents
Skelp, gr. steel, P'gh, lb.	1.70	1.70	1.70	2.20
Light rails at mill	1.50	1.50	1.50	2.20
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	1.96	1.96	1.96	2.25
Iron bars, Chicago	1.75	1.75	1.70	2.20
Steel bars, Pittsburgh	1.70	1.70	1.60	2.00
Steel bars, Chicago	1.75	1.75	1.70	2.38
Steel bars, New York	1.98	1.98	1.88	2.38
Tank plates, Pittsburgh	1.60	1.60	1.60	1.90
Tank plates, Chicago	1.75	1.75	1.70	2.28
Tank plates, New York	1.98	1.98	1.98	2.28
Beams, Pittsburgh	1.60	1.60	1.60	2.00
Beams, Chicago	1.75	1.75	1.70	2.38
Beams, New York	1.98	1.98	1.98	2.38
Steel hoops, Pittsburgh	2.40	2.40	2.25	2.50

*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.

†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

Sheets, Nails and Wire,	June 20, 1922	June 13, 1922	May 23, 1922	June 21, 1921
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh	3.15	3.15	3.15	3.75
Sheets, galv., No. 28, P'gh	4.15	4.15	4.15	4.75
Sheets, blue an'l'd, 9 & 10	2.40	2.40	2.40	2.85
Wire nails, Pittsburgh	2.40	2.40	2.40	3.00
Plain wire, Pittsburgh	2.25	2.25	2.25	2.75
Barbed wire, galv., P'gh	3.05	3.05	3.05	3.85
Tin plate, 100-lb. box, P'gh	$4.75	$4.75	$4.75	$6.25
Old Material, Per Gross Ton:				
Carwheels, Chicago	$18.25	$18.25	$18.00	$13.25
Carwheels, Philadelphia	17.00	17.00	17.00	18.00
Heavy steel scrap, P'gh	17.00	17.00	17.50	12.75
Heavy steel scrap, Phila	15.00	15.00	15.00	11.00
Heavy steel scrap, Ch'go	14.50	14.50	14.75	10.50
No. 1 cast, Pittsburgh	18.50	18.50	18.50	16.50
No. 1 cast, Philadelphia	19.00	19.00	18.50	17.50
No. 1 cast, Ch'go (net ton)	*15.75*	16.00	16.25	12.50
No. 1 RR. wrot, Phila	17.00	17.00	17.00	14.00
No. 1 RR. wrot, Ch'go (net)	12.50	12.50	12.75	9.50
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$6.50	$6.50	$6.00	$2.75
Foundry coke, prompt	7.00	7.00	6.50	4.50
Metals,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	*13.75*	14.00	13.87½	12.75
Electrolytic copper, N. Y.	*13.50*	13.75	13.62½	12.75
Zinc, St. Louis	*5.37½*	5.42½	5.15	4.45
Zinc, New York	*5.72½*	5.77½	5.50	4.95
Lead, St. Louis	5.60	5.60	5.45	4.29
Lead, New York	*5.85*	5.90	5.70	4.40
Tin (Straits), New York	**31.37½**	31.00	30.75	28.75
Antimony (Asiatic), N. Y.	*5.10*	5.25	5.37½	5.12½

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Composite Price, June 20, 1922, Finished Steel, 2.141c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets — These products constitute 88 per cent of the United States output of finished steel

June 13, 1922,	2.141c.
May 23, 1922,	2.127c.
June 21, 1921,	2.607c.
10-year pre-war average,	1.689c.

Composite Price, June 20, 1922, Pig Iron, $24.05 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham

June 13, 1922,	$23.89
May 23, 1922,	23.71
June 21, 1921,	21.58
10-year pre-war average,	15.72

The rate of operation would be heavier if full supplies of coal and coke could be had. Not much is doing in pig iron, excepting foundry, but prices are strong. There is a moderate demand for billets and sheet bars, and several sales of sheet bars have been made by Valley mills in the past week at $35 at mill. Finished steel bars and sheets are probably the most active items, but plates, shapes, pipe and tin plate are also in active demand. Scrap is quiet, with prices only fairly steady.

A growing scarcity in labor supply is a feature of the market, and is crippling the mills to some extent in output. This is being particularly felt in the sheet mills, and at one leading sheet mill it is stated that 1000 more men could be put to work. The labor shortage is not confined to ordinary common labor, but extends through sheet mill operations up to heaters and rollers, these being the highest paid men.

Pig Iron.—Sales in the local market continue to be confined almost exclusively to foundry grades, practically nothing being done in Bessemer or basic. The Westinghouse Electric & Mfg. Co. has closed for about 700 tons of foundry for its Cleveland works, and about 900 tons for the Trafford City works, the price reported being $24 at Valley furnace and the grade of iron equal to No. 2 foundry. Recently a Wheeling steel interest came in the market for 3000 tons of Bessemer iron, and the business is reported to have gone to an Ironton, Ohio, producer at $23.50 at maker's furnace, the iron to be shipped by river to Wheeling. There have been moderate sales of foundry iron, ranging from 100 to 250 tons at $24, Valley furnace. While there is no inquiry for Bessemer or basic, prices remain firm and it is claimed $25 at Valley furnace for both grades could not be shaded. There is some resale Bessemer and basic iron on the market, and probably on this iron prices might be shaded 50c. a ton. A local consumer bought 1000 tons of Bessemer lately at $24.50 at furnace, but the delivered freight rate is less than from the Valley, the seller simply giving away his advantage in this respect. The Shenango Furnace Co. has banked its No. 1 stack, owing to lack of coke, but expects to get it on again in a few days.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being $1.96 per gross ton:

Basic	$25.00
Bessemer	25.00
Gray forge	$23.50 to 24.50
No. 2 foundry	24.00 to 25.00
No. 3 foundry	23.50 to 24.50
Malleable	24.50

Ferroalloys.—The probability of a heavy duty being put on ferromanganese, which now is free, is causing consumers to get under cover, and sales in this market in the past week have been active. One concern reports having sold upward of 1500 tons of British product in the past week at $67.50, c.i.f., Atlantic seaboard, the buyer to pay the duty if any is put on before the alloy is delivered. We also note other smaller sales of British alloy at the same price. Practically no domestic ferromanganese is being offered in the open market; all the sales being made are British with prompt shipping on receipt of cable orders. The market on spiegeleisen is fairly active with prices unchanged, and this applies also to ferrosilicon and silvery iron.

We quote 78 to 82 per cent ferromanganese, $67.50 c.i.f. Atlantic seaboard for domestic and $67.50 for English. Average 20 per cent spiegeleisen, $36 furnace; 16 to 19 per cent, $35 furnace; 50 per cent ferrosilicon, domestic, $55 to $60 furnace, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, $41.50; 11 per cent, $44.80; 12 per cent, $48.10; 13 per cent, $52.10; 14 per cent, $55.10; silvery iron, 6 per cent, $30; 7 per cent, $31; 8 per cent, $32.50; 9 per cent, $34.50; 10 per cent, $36.50; 11 per cent, $39; 12 per cent, $40.50. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is $4.06 per gross ton.

Structural Material.—Actual awards for several weeks have been quiet, but a good deal of business is being figured on that may come out later. Mills are back in deliveries, production being curtailed to some extent by the coal strike. Local fabricating shops are pretty well filled up over the next two or three months. The Carnegie Steel Co. continues to quote plain material at 1.60c., the other local producers quoting the same price to regular customers and 1.70c. to other buyers. Prices are given on page 1777.

Plates.—Some new car buying has come out in the past week, as noted in another column. A good part of the tonnage going to plate mills for some time has come from the car builders. The Carnegie Steel Co. still quotes plates to regular customers at 1.60c., but independent mills are quoting 1.65c. to 1.70c. at mill, for tank quality.

Tin Plate.—While a large tonnage of tin plate for delivery over the last half of the year has been placed by leading consumers, it is stated that much is yet to be placed. Indications are that the mills will run close to present rate of operation, which is about 80 per cent, over the remainder of the year. Large consumers are specifying freely against contracts, and shipments are heavy. The American Sheet & Tinplate Co. has extended through August and September its price of 3.15c. on tin mill black sheets. We quote tin plate at $4.75 per base box, and tin mill black sheets at 3.15c. to 3.25c. at mill, some sellers quoting the higher price.

Sheets.—The action of the American Sheet & Tin Plate Co. in extending through August and September its July prices on sheets has disarranged the market to some extent. Most independent mills fully expected the leading interest would advance its prices for the later month. Accordingly they were holding off from selling to some extent. Some of the independent mills may now offer sheets to regular customers for August and September shipment at close to the leading interest's price. To other consumers they are expected to get the $3 advance they have been quoting for some time. A certain group of sheet mills shows sales up to June 19 of 90,000 tons against 55,000 tons for the same period in May. Shipments by this group up to June 19 showed a slight increase over the same period last month. The American Sheet & Tin Plate Co. is operating this week to about 90 per cent of hot sheet mill capacity, while independent mills are running at 80 to 82 per cent. Not much is doing in export, Japan being out of the market but moderate shipments are being made to Canada and South America by local mills. Prices are given on page 1777 and for No. 22 gage auto-body sheets, 4.50c. is quoted. Prices of independent mills are usually $3 per ton higher, except on auto-body sheets, which are $5 per ton higher.

Hot Rolled Flats.—Local makers report demand as quite active, and the recently established price of 2.40c. by independent makers for third quarter shipment is said to be firmly held. The Carnegie Steel Co. continues to quote at 2.25c. for indefinite delivery, but has a limited quantity to sell. Consumers seem to prefer to pay the higher price for reasonably prompt delivery.

Cotton Ties.—The leading local makers report that the season will likely open early in July, but nothing has been given out as to prices.

Wire Rods.—Demand is fairly active, but the available supply for the open market is limited. Two makers say that on such quantities as they can spare to regular customers they are quoting $38 at mill, while in some cases as high as $40 has been named. Costs of making rods have gone up steadily, and an intimation has been made that the makers referred to may advance the price to $40 within a short time. A sale of 300 tons of Bessemer rods for chain making purposes is reported at $38 at mill.

We quote No. 5 common basic or Bessemer rods $38, chain rods $38, screw stock rods $43; rivet and bolt rods and other rods of that character, $38. High carbon rods, $45 to $48, depending on carbons, per gross ton, f.o.b. Pittsburgh or Youngstown.

Wire Products.—Wire nail demand seems to have quieted down to some extent, possibly due to the fact that consumers are waiting until after July 1 to secure the reduction in freight rates. Independent mills are said to be adhering quite strongly to the $2.50 base price, but in a few cases have met the $2.40 price of the leading interest. There is some indifference among independent mills to sell wire and wire nails for delivery over third quarter at present prices, owing to uncertainty of future costs. Prices on wire nails, wire and woven fence wire are given on page 1777.

Fluorspar.—Demand is fairly active but mostly from Eastern consumers. We continue to quote at $16 per ton f.o.b. mines, Kentucky and Illinois, for fluorspar to contain 80 to 85 per cent calcium fluoride.

Rivets.—Makers say that the recent advance of $3 per ton on structural and boiler rivets, and also the advance in prices of small rivets, are being adhered to rigidly. Demand continues active and manufacturing costs have gone up considerably. Prices on boiler and structural rivets, and discounts on small rivets are given on page 1777.

Warehouse Prices.—Carnegie Steel Co. and Jones & Laughlin Steel Co. continue to quote 2.20c. base on soft steel bars and 2.30c. base on structural shapes and plates and 2.85c. base on steel bands. These prices were adopted by these two interests on June 6, and are said to be holding firm. Considerable material is moving out from warehouses, some consumers being willing to pay higher prices from warehouses to get prompt deliveries, rather than to wait on delayed shipments from the mills.

Billets, Sheet Bars and Slabs.—Several sales of sheet bars have been made in the past week for July delivery by Youngstown mills on the basis of $25 at mill. A sale of about 600 tons of 4 x 4-in. billets is reported at the same price and for July delivery. New inquiries for billets and sheet bars have apparently quieted down, and one local interest states it has offered sheet bars in the past day or two at $35 at mill, without finding buyers. At the same time, deliveries by the mills continue slow.

We quote 4 x 4-in. soft Bessemer and open-hearth billets at $35; 2 x 2-in. billets, $35; Bessemer and open-hearth sheet bars, $35; slabs, $35; forging billets, ordinary carbons, $40, all f.o.b. Youngstown or Pittsburgh mills.

Iron and Steel Bars.—The pressure on the mills for delivery for steel bars is heavy, the Carnegie Steel Co. being four weeks or longer back in deliveries, and the situation is growing more tense. The demand for steel bars is probably more active than on any other finished steel product, with the possible exception of sheets. The activity in building all over the country is causing a heavy demand for reinforcing bars. The Fort Pitt Bridge Works has an inquiry out for about 6000 to 6500 tons of reinforcing bars for delivery at its works at Canonsburg, Pa. Upward of 3000 tons will be required for the new Schenley apartments to be built in

this city. Other inquiries range from 250 up to 1000 tons. Demand for iron bars is also quite active.

We quote steel bars rolled from billets at 1.60c. to 1.75c.; reinforcing bars, rolled from billets, 1.60c. to 1.75c. base; reinforcing bars, rolled from old rails, 1.50c.; refined iron bars, 2.10c. in carloads, f.o.b. mill, Pittsburgh.

Track Equipment.—In the past week track bolts were advanced $3 per ton by two local makers, who are now quoting 3.25c. at mill in large lots. Persistent reports are that the Baltimore & Ohio Railroad and the Pennsylvania Railroad each placed 5000 kegs of standard spikes with a Philadelphia maker recently. The demand for track equipment over the next three or four months is regarded by local makers as likely to be urgent, as a number of leading railroads have recently set aside large sums of money to be used in track betterment. The Wabash Railroad has announced that it will spend, over the next six months, about $7,000,000 in the purchase of cars, rails and general track equipment. One leading maker continues to quote standard railroad spikes at $2.25 and another is quoting $2.35 per 100 lb. at mill. Tie plates remain at $1.75 to $2 per 100 lb., depending upon specifications and the size of the order. Prices on track equipment are given on page 1777.

Bolts and Nuts.—Practically all makers here are now quoting the higher prices on bolts and nuts adopted early this month and state that these higher prices are fully warranted by the higher costs of fuel, labor and incidentals. The demand for nuts and bolts is fairly active, the bulk of the trade coming from the automobile builders, who have been buying quite heavily for some time. The new discounts as agreed upon recently by practically all makers are given on page 1777.

Cold Finished Steel Bars and Shafting.—Sales are largely to automobile builders. From other consumers demand is only fairly active. Cold rolled steel bars are firm at 3c., base, Pittsburgh, and ground shafting at 2.50c., base, at mill, in large lots.

Steel Skelp.—Several pipe mills that ordinarily produce all they use are buyers of skelp. For domestic consumption, we quote sheared steel skelp at 1.60c. to 1.65c. and grooved at 1.70c. to 1.75c. at mill. Narrow grooved skelp is hard to obtain and is reported to have sold very close to 2c. at mills.

Iron and Steel Pipe.—A heavy run of orders continues for both iron and steel pipe, especially in butt weld sizes or steel pipe used for building purposes. Activity in the oil business has brought out recently several fairly large inquiries for line pipe, but details are not yet available. Several pipe makers say that higher prices on both iron and steel pipe are fully justified by their higher operating costs. Discounts now in effect are given on page 1777.

Boiler Tubes.—Makers report orders ahead for several months. Prices are reported firm, with the exception that regular discounts on steel welded tubes are said to be occasionally shaded. Discounts on steel and charcoal iron tubes are given on page 1777.

Cold Rolled Strips.—Demand is reported by local makers as quite active, and prices holding firm. Makers claim that with the higher prices they are paying for coal, and also for certain kinds of labor, the price of cold-rolled strips as recently fixed at 4c. base, Pittsburgh, is fully justified and is holding firm. As yet the American Steel & Wire Co. has not advanced its price on cold-rolled strip, but may do so in the near future. Prices are given on page 1777.

Coal and Coke.—Nothing of interest came out in the coal strike in the past week. In the meantime, there is a good deal of demand for furnace coke, with very little available, but the demand for foundry coke has fallen off. Independent steel companies that have by-product coke plants, and most of them have, refuse to sell any surplus coke, and are putting it into stock piles. The coming reduction in freight rates on July 1 means quite a saving in shipments of coal and coke and is having the effect of quieting down the market. Large quantities of Southern coal are being brought to this market, and it is stated that some of the mines are working overtime to supply the demand. Both Kentucky and West Virginia coal is now quoted at $3.25 to $3.50 for either steam or gas purposes. Standard furnace coke is held at $6.50 to $7, and 72-hr. foundry from $7 to $7.50 per net ton at ovens.

Iron and Steel Scrap.—There is almost an entire absence of new business in the local scrap market, leading consumers evidently being covered for some time and out of the market. The reduction in freight rates on July 1 has served to hold up shipments to some extent, in addition to causing consumers to be indifferent about making new contracts. Local dealers say that they have made practically no sales of any moment for three or four weeks, and are not urging customers to buy at this time, as they believe prices after July 1 may be higher. The available supply is light, and any considerable demand for heavy melting scrap would probably very quickly cause an advance in prices. Demand for foundry purposes is quiet, and prices are inclined to weakness. A sale of about 850 tons of heavy melting steel scrap for July delivery is reported at $17, delivered. Turnings and borings, though quiet in this market, are reported active in the Cleveland and Youngstown districts.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate as follows per gross ton:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh	$17.00 to $17.25
No. 1 cast, cupola size	18.50 to 19.00
Rerolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.	17.00 to 17.50
Compressed sheet steel	15.00 to 15.25
Bundled sheets, sides and ends	13.50 to 14.00
Railroad knuckles and couplers	18.00 to 18.50
Railroad coil and leaf springs	18.00 to 18.50
Low phosphorus standard bloom and billet ends	20.00 to 21.00
Low phosphorus plates and other grades	19.00 to 20.00
Railroad malleable	16.00 to 16.50
Iron car axles	26.00 to 27.00
Locomotive axles, steel	24.00 to 25.00
Steel car axles	17.50 to 18.00
Cast iron wheels	17.00 to 17.50
Rolled steel wheels	17.50 to 18.00
Machine shop turnings	13.25 to 13.75
Sheet bar crop ends	18.50 to 19.00
Heavy steel axle turnings	15.00 to 15.50
Short shoveling turnings	14.25 to 14.50
Heavy breakable cast	17.50 to 18.00
Stove plate	14.00 to 14.50
Cast iron borings	14.00 to 14.50
No. 1 railroad wrought	14.50 to 15.00
No. 1 busheling	14.00 to 15.00

Youngstown

YOUNGSTOWN, OHIO, June 20.—Current steel prices are being supported by a firm demand. Standard basic pig iron, however, has sold off $1 per ton, at $24, for small lots. In some instances foundries have been buying high silicon basic, through inability to obtain required supplies of foundry grades.

Independents are generally adhering to a 30-day price policy. One large interest reports it has entered sizeable tonnages of blue annealed sheets at 2.55c. and black at 3.30c. Black sheets have moved in some cases at 3.50c.

A Valley interest reports the sale of 750 tons of 4 x 4-in. billets, for Eastern consignment, at $37, Youngstown, but does not regard this as indicating any price change.

Melters have paid as high as $19 for heavy melting scrap, but current range to consumers is $18.50 to $18.75.

The Republic Iron & Steel Co. is considering resumption of a third blast furnace and its Bessemer department.

The New England Foundrymen's Association held its first summer outing, Wednesday, June 14, at the Point Shirley Club, Winthrop, Mass., some 70 members attending. E. H. Ballard, General Electric Co., president, announced at the shore dinner that there will be no July meeting of the association, but that instead it will be the guest of the Providence, R. I., members on Aug. 9, at Hommocks, R. I. C. A. Reed, president Reed, Fears & Miller, Inc., Boston, was chairman.

Chicago

Concern Over Coal Situation — Pig Iron Higher—Large Structural Business

CHICAGO, June 20.—The coal situation is causing increasing concern among both producers and consumers of iron and steel. Visible stocks of coal above ground are said to cover only three or four weeks' supply and to complicate the situation further, the distribution among users of fuel is uneven. It is felt in some quarters that the crisis will come not later than Aug. 1. In the meantime the coal market is exceedingly strong and in some instances has advanced above the maximum prices recommended by Secretary Hoover.

Steel mills find themselves in a tight position. Not only are their future costs uncertain but their very operation is endangered. It is not surprising that they are cautious in taking additional business with current specifications greatly exceeding shipments and with backlogs in the heavier products which will carry them through the third and in some instances well into fourth quarter. In view of the difficulties they have had to encounter, it is astonishing how successfully they have maintained their operations up to the present time. The Illinois Steel Co. is still producing at 85 per cent of ingot capacity, while the Inland Steel Co. is on a 70 per cent basis.

Notwithstanding steadily receding mill deliveries, large projects involving steel are still being placed. The Sinclair Consolidated Oil Corporation has placed 65 storage tanks, of which 50 requiring 26,000 tons of steel were awarded to the Chicago Bridge & Iron Works, and 15 involving 4000 tons were let to the Phoenix Iron Works. The steel for the Chicago fabricator will be furnished by the Illinois Steel Co. A large local construction project, the Stratford office building, requiring 9000 tons, has been placed with the Morava Construction Co. The Inland Steel Co. will supply the plain material. Additional orders for freight cars, car bodies and car repairs have been placed and a number of sizable inquiries have appeared.

Pig Iron.—Local iron is stronger, the minimum going quotation on prompt material being $24 base, furnace, while nothing less than $23.50 is being named for second half shipment. Buying is more active and at the same time furnace costs are rising. Average fuel costs are increasing as producers find it necessary to buy larger quantities of coal on the open market. At the same time the recent reduction in ore prices is in reality an advance for most merchant interests. On Jan. 1, when the pig iron market was exceedingly dull, most merchant furnaces marked down their inventories to levels which they thought would approximate the ruling price of ore for this year. As it turns out, the figures at which they have been carrying this material are considerably below the new price of $5.05 for Mesabi non-Bessemer. Ore shipments from the head of the Lakes are now about two months behind and a tense situation as regards supply may develop this fall as a result of that fact. Another market factor pointing to higher prices is the fact that stocks on merchant furnace yards the country over are low. That melters likewise have no yard accumulations to speak of is indicated by the fact that sellers are receiving few requests to hold up shipments pending the freight reductions and in some instances have been asked to anticipate deliveries. Inquiries are more numerous, some of them being of size. A local railroad equipment maker wants 5000 tons of foundry iron for third or fourth quarter delivery and a Kewanee melter is inquiring for 3500 tons of foundry for third quarter. A Michigan buyer wants 2000 tons of malleable iron for the third quarter and three Wisconsin melters are inquiring for 500 tons of foundry iron and another Illinois user for 400 tons for the same delivery. Southern iron can still be bought at $18.50 base, Birmingham. Recent sales of Southern foundry iron in this district include two 600-ton lots, one of 500 tons and two of 300 tons, all for third quarter. Low phosphorus iron is in demand, the largest current inquiry calling for 1000 tons. High silicon iron is also more active, 500 tons of 10 per cent having been bought by one local interest and 500 tons of 15 per cent ferrosilicon by another. Several charcoal iron makers have advanced their prices $1 to $26.50, furnace, but this quotation is not yet general. A sale of 100 tons of charcoal iron has been made to a local melter. The Zenith furnace in Duluth is now in, having made its first iron Sunday. The Thomas furnace in Milwaukee is expected to go in about Aug. 1. The second boatload of Lackawanna iron, about 5000 tons of foundry, arrived in Chicago to-day. This is the last consignment of the tonnage bought by a leading broker for this market.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago	$29.00 to $30.00
Northern coke, No. 1, sil. 2.25 to 2.75	24.00 to 24.50
Northern coke, foundry, No. 2, sil. 1.75 to 2.25	23.50 to 24.00
Northern high phos	23.50 to 24.00
Southern No. 2	24.42 to 25.17
Malleable, not over 2.25 sil	23.50 to 24.00
Basic	23.50 to 24.00
Low phos. Valley furnace, sil. 1 to 2 per cent copper free	35.00
Silvery, sil. 8 per cent	37.82

Ferroalloys.—Demand for ferromanganese is very active, several orders ranging from 500 to 1000 tons each having been placed and a number of sizable inquiries still being pending. In almost every case prompt shipment is asked, evidently for the purpose of getting delivery before the tariff goes into effect. Spiegeleisen is also in demand, a number of inquiries ranging from carlots up to 150 tons being in the market. Prices are unchanged, although the quotation of $67.50 base, seaboard, on ferromanganese is fast disappearing.

We quote 78 to 82 per cent ferromanganese, $75.90 to $80.40, delivered; 50 per cent ferrosilicon, $55, delivered; spiegeleisen, 18 to 22 per cent, $46.50 to $47, delivered.

Bars.—Demand for soft steel bars is unabated, but as mills are so heavily booked ahead that they are not anxious to add to their commitments, users are experiencing difficulty in obtaining additional material. Orders for bar iron are sufficient in the aggregate to keep mills running, but they are not heavily booked ahead and can give much better delivery than is possible on soft steel bars. Prices range from 1.75c. to 1.80c., Chicago. Better buying of rail carbon steel bars is anticipated in view of the preparations of implement makers for fall production schedules. The Republic Iron & Steel Co. now plans to start its Moline mill in August.

Mill prices are: Mild steel bars, 1.75c. to 1.85c., Chicago; common bar iron, 1.75c. to 1.80c., Chicago; rail carbon, 1.60c. mill or Chicago.

Jobbers quote 2.48c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.40c. for rounds and 3.90c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 2.38c. base. Hoops, 3.48c. Bands, 3.23c.

Bolts and Nuts.—The new discounts are firm and business is in good volume although consisting of smaller specifications. It is evident that consumption is increasing, but buyers are still cautious and are following the policy of placing orders often in small lots rather than contracting ahead. Both car builders and railroads have been buying car bolts liberally of late. For mill prices, see Finished Iron and Steel, f. o. b. Pittsburgh, page 1777.

Jobbers quote structural rivets, 3.10c.; boiler rivets, 3.20c.; machine bolts up to ¾ x 4 in., 50, 10 and 10 per cent off; larger sizes, 50 and 10 off; carriage bolts up to ⅝ x 6 in., 50 and 5 off; larger sizes, 45 off; hot pressed nuts, squares and hexagon tapped, $3.25 off; blank nuts, $3.50 off; coach or lag screws, gimlet points square heads, 60 per cent off, quantity extras are unchanged.

Wire Products.—There is no let-up in the demand for wire and nails, but mills are not anxious to add to their present heavy commitments and are refusing to accept orders in whole or in part. Mill warehouses are bare and shipments are being filled directly from production. For mill prices, see Finished Iron and Steel, f. o. b. Pittsburgh, page 1777.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, $3.10 per 100 lb.; No. 9 and heavier bright basic wire, $3.25 per 100 lb.; common wire nails, $3.25 per 100 lb.; cement coated nails, $2.75 per keg.

Sheets.—Some users are attempting to place business for fourth quarter but without success. The price situation remains unchanged with the leading maker booked through July at the minimum prices and the local independent, which has been selling at $2 to $3 higher, out of the market.

Mill quotations are 3.15c. to 3.30c. for No. 28 black, 2.40c. to 2.50c. for No. 10 blue annealed and 4.15c. to 4.30c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 38c. per 100 lb.

Jobbers quote blue annealed, 3.63c.; black, 4.45c.; galvanized, 5.45c.

Structural Material.—Structural awards are more numerous and involve larger individual tonnage than has been the case for several weeks. Fabricating shops are busy but are encountering difficulty both in getting delivery on steel and in obtaining labor. Plain material prices are unchanged but the leading independent is practically out of the market and the foremost producer is selling for indefinite delivery only.

The mill quotation on plain material is 1.75c. to 1.85c., Chicago. Jobbers quote 2.58c. for plain material out of warehouse.

Warehouse Prices.—Jobbers' prices remain unchanged. Buying out of warehouse is in good volume, although not so heavy as just prior to the recent advances. Slow deliveries from mills are causing many buyers to order steel out of store for their immediate needs.

Rails and Track Supplies.—The feature of the market is an inquiry for 22,000 tons of standard section rails from a road which had previously bought for this year and has received most of the tonnage called for in that purchase. Otherwise the rail market is quiet. Orders for track supplies are heavier, recent bookings of one mill including 20,000 kegs of spikes and bolts, 5000 tons of angle bars and 3000 tons of tie plates.

Standard Bessemer and open-hearth rails, $40; light rails rolled from new steel, 1.75c., f.o.b. makers' mills.

Standard railroad spikes, 2.12c. to 2.25c., Pittsburgh; track bolts with square nuts, 3.12c. to 3.25c., Pittsburgh; tie plates, steel and iron, 1.85c., f.o.b. mill; angle bars, 2.40c., f.o.b. mill.

Cast Iron Pipe.—Current buying is largely in small tonnages and competition is not as sharp as earlier in the year. Kansas City, Mo., takes bids on 200 tons June 21, and smaller inquiries have been put out by Ellsworth, Kan., and Hampton, Iowa. Pipe shops are comfortably booked.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., $50.10 to $50.60; 6-in. and above, $46.10 to $46.60; class A and gas pipe, $3 extra.

Reinforcing Bars.—Lettings and inquiries for reinforcing projects are still numerous. Awards include:

Beaver reservoir, Cedar Rapids, Iowa, 300 tons, to Paul J. Kalman Co.

High school, Danville, Ill., 400 tons, to J. I. Gedney, East St. Louis.

Pending work includes:

Paper mill, Kalamazoo, Mich., Vegetable Parchment Co., 500 tons, bids to be in June 21.

Main Street Bridge, Green Bay, Wis., Green Construction Co., that city, general contractor, 200 tons, of which only 100 tons to be bought at present.

Head-house, Chicago Union Station, 400 tons, R. C. Wiebeldt, general contractor.

Olinger Film Exchange, Milwaukee, 125 tons.

Plates.—Recent railroad orders for new cars, car bodies and car repairs have been liberal and will call for large tonnages of plates, shapes and bars. There is also considerable steel pending for oil storage tanks, although with local mills heavily committed, it is thought likely that this work will be left to Eastern fabricators. The market continues to range from 1.75c. to 1.85c., Chicago, with an independent mill which is able to give delivery on some sizes in six to eight weeks asking a minimum of 1.80c., Chicago.

The mill quotation is 1.75c. to 1.85c., Chicago. Jobbers quote 2.58c. for plates out of stock.

Steel Castings.—The American Steel Foundries will soon announce new discounts on steel castings applying to third quarter business, which will represent an advance of about 5 per cent over the discounts of April 1. Notwithstanding the 10 per cent reduction in freight rates which becomes effective July 1, increases in material costs greatly outweigh the saving which will be effected in transportation. It is pointed out that the cost of metals in the ladle has increased fully 14 per cent since April 1, when the last discounts were announced. The individual advances of the various constituents of the ordinary charge were as follows, figured at Pittsburgh: low phosphorus pig iron, 8 per cent; Bessemer pig iron, 26 per cent; low phosphorus scrap, 23 per cent; heavy melting steel scrap, 15 per cent; 80 per cent ferromanganese, 7 per cent; 10 per cent ferrosilicon, 15 per cent. It is stated that production costs generally are steadily advancing and that unless this trend is interrupted, still further increases in castings prices will prove necessary.

Old Material.—The market remains quiet with practically no buying of the steel grades. In fact, mills are receiving shipments of this class of material faster than they can take care of it under present labor conditions. Dealers who sold short are now fairly well covered on their contracts with the result that the available supply of open hearth grades in the market is low. Some consumptive buying of iron mill grades has developed during the past week, the operations of users being on a somewhat improved scale. There has been a scattering of orders for cast scrap from foundries but large purchases have been lacking. The demand for rerolling rails is not active, but the expected resumption of operation by a Moline mill is counted upon to increase consumption. Prices show few important changes, slight advances in some grades being balanced by declines in others. On the whole the market shows a tendency to hold to the same general level, pending the reduction in freight rates effective July 1. After that date heavier shipments from country dealers and industrial producers are expected. Larger railroad offerings are also looked forward to as a logical result of the wage reductions which go into effect next month. Current railroad lists include the Rock Island, 8700 tons, of which 1500 tons is rerolling rails and the Wabash, 2000 tons. Successful bids on the 21,000 tons of steel shells offered by the Government here last week ranged from $14.40 to $18 a gross ton. Tonnages were awarded to the Hyman Michaels Co., Briggs & Turivas, David Joseph and the Pennsylvania Wood & Iron Co.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Iron rails	$17.50 to $18.00
Cast iron car wheels	18.25 to 18.75
Relaying rails	22.50 to 27.50
Rolled or forged steel car wheels	16.25 to 16.75
Steel rails, rerolling	15.25 to 15.75
Steel rails, less than 3 ft	16.00 to 16.50
Heavy melting steel	14.50 to 15.00
Frogs, switches and guards cut apart	14.50 to 15.00
Shoveling steel	14.00 to 14.50
Drop forge flashings	9.75 to 10.25
Hydraulic compressed sheet	11.50 to 12.00
Axle turnings	12.00 to 12.50

Per Net Ton

Iron angles and splice bars	16.00 to 16.50
Steel angle bars	13.75 to 14.25
Iron arch bars and transoms	16.75 to 17.25
Iron car axles	21.50 to 22.00
Steel car axles	14.50 to 15.00
No. 1 busheling	11.00 to 11.50
No. 2 busheling	6.75 to 7.25
Cut forge	12.75 to 13.25
Pipes and flues	8.75 to 9.25
No. 1 railroad wrought	12.50 to 13.00
No. 2 railroad wrought	12.75 to 13.25
Steel knuckles and couplers	14.25 to 14.75
Coil springs	14.25 to 14.75
No. 1 machinery cast	15.75 to 16.25
No. 1 railroad cast	15.25 to 15.75
Low phos. punchings	13.50 to 14.00
Locomotive tires, smooth	11.50 to 12.00
Machine shop turnings	6.75 to 7.25
Cast borings	10.25 to 10.75
Stove plate	14.00 to 14.50
Grate bars	12.75 to 13.25
Brake shoes	12.75 to 13.25
Railroad malleable	15.00 to 15.50
Agricultural malleable	15.00 to 15.50

W. J. Reed, formerly secretary Wisconsin Bridge & Iron Co., Milwaukee, and George W. Smith, formerly vice-president Gibbs Steel Co., Milwaukee, have organized the Reed-Smith Co. for the sale of steel products out of warehouse in that city. A new warehouse has been erected.

New York

Scotch and Middlesbrough Irons Arriving—More Sales of 1.70-Cent Finished Material

Pig Iron.—There is little buying of pig iron. In the past week some New England business was closed with textile machinery foundries and a New Jersey foundry has bought 750 tons. Buyers are not inclined to speculate either on the outcome of the coal strike or upon a railroad strike. Nearly all foundries have a fair supply of iron and it is evident that the reduction in freight rates has led some to postpone calling for shipments or adding to their commitments. It is understood that a 5000-ton lot of No. 3 Scotch iron will arrive at Boston this week. A smaller lot of Middlesbrough iron is due to arrive soon at New York. A considerable part of the Scotch iron has been disposed of, but not all. Two steel interests, one in the East and one in the Buffalo district, are again ready to offer foundry iron. Furnaces differ as to selling ahead. A recent inquiry by a large foundry brought out the fact that half of the bidders, and there were seven or eight in all, were willing to sell for delivery in the fourth quarter. There is still a considerable range on Buffalo iron. One furnace company has $25 for its base while another has been quoting $23. The quotation below for Buffalo iron is based on the rail rate, but delivery can be had in the New York district based on a $3 canal freight.

We quote delivered in the New York district as follows, having added to furnace prices $2.52 freight from eastern Pennsylvania, $5.46 from Buffalo and $6.16 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25	$28.52 to $29.02
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	27.52 to 28.02
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	27.02 to 27.52
Buffalo, sil. 1.75 to 2.25	28.46 to 29.46
No. 2 Virginia, sil. 1.75 to 2.25	29.16

Ferroalloys.—The most interesting development in the ferromanganese market is that American producers are not only inquiring for fairly large quantities of British ferromanganese for July shipment, but have made substantial purchases. Sales by representatives of British producers have been fairly large and inquiry is reported active. Although a report is current that the British quotation of $67.50, seaboard, is to be raised to $70, no confirmation of such a step has been learned and it is even regarded as improbable by some representatives. A cargo of about 4000 tons reached Baltimore this week. The spiegeleisen market is quiet at prevailing quotations and the British alloy is being offered, but the prices are slightly higher than those of American producers. No activity is reported in the manganese ore market. The 50 per cent ferrosilicon market is quiet at prevailing prices. Quotations are as follows:

Ferroalloys

Ferromanganese, domestic, seaboard, per ton	$67.50
Ferromanganese, British, seaboard, per ton	$67.50
Spiegeleisen, 20 per cent	$36.00
Ferrosilicon, 50 per cent, delivered, per ton	$55.00 to $60.00
Ferrotungsten, per lb. of contained metal	40c. to 50c.
Ferrochromium, 6 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr., delivered	12c. to 14c.
Ferrovanadium, per lb. of contained vanadium	$3.00 to $3.50
Ferrocarbontitanium, 15 to 18 per cent, 1 ton to carloads, per ton	$200.00

Ores

Manganese ore, foreign, per unit, seaboard	25c. to 26c.
Tungsten ore, per unit, in 60 per cent concentrates, nominal	$3.00 up
Chrome ore, basis 48 per cent Cr_2O_3, crude, per unit, Atlantic seaboard	40c. to 45c.
Molybdenum ore, 85 per cent concentrates, per lb. of MoS_2, New York	40c. to 45c.

Finished Iron and Steel.—Steel prices tend toward greater strength. With the exception of a very few mills, it is no longer possible to buy plates, shapes and bars below 1.70c., Pittsburgh. The exception is chiefly on plates, which two or three mills are still quoting at 1.60c., Pittsburgh, when the specifications are attractive. On the other hand, some fairly good orders for plates have been placed at 1.70c. There is a good demand for concrete reinforcing bars and the concession usually granted on this business from the price of merchant steel bars is missing. One lot of 1000 tons of reinforcing bars was sold a few days ago at 1.70c. Pittsburgh. Concrete buildings recently awarded the Turner Construction Co., New York, include the Genesee Building, Buffalo, a cold-storage building at Williamsport, Pa., and a warehouse at Buffalo. The strength in the heavier products also extends to the lighter forms of steel. Most makers of hoops and bands are now quoting 2.35c., Pittsburgh, while sheets from independent mills are usually quoted $3 a ton above the prices of the American Sheet & Tin Plate Co. Wire products are firm, but demand has slackened. Some mills are turning down orders for tubular goods, butt weld pipe in particular being scarce for early delivery. In structural steel there is some evidence of lessened activity, but the mills continue to book in the aggregate very substantial tonnages. The largest structural job of the week is 65 oil tanks contracted for by the Sinclair Consolidated Oil Corporation, requiring 18,000 tons of steel. Fifty of the tanks will be built by the Chicago Bridge & Iron Works and 15 by the Phoenix Iron Co., Meadville, Pa. A list of fabricated steel work contracted for and pending is published in another column. The New York Central has asked for bids by June 29 on its third quarter steel requirements, consisting of 4000 tons of plates, shapes and bars, 750 tons of wire nails and staples, 500 tons of black sheets, 3000 tires, 3000 axles, 15,000 ft. of seamless steel tubing and 400 tons of billets.

We quote for mill shipments, New York, as follows: Soft steel bars, plates and structural shapes, 1.98c. to 2.08c.; bar iron, 1.98c. On export shipments the freight rate from Pittsburgh to New York is 28.5c. per 100 lb. and the domestic rate is 38c.

Cast Iron Pipe.—Private buying is still heavy and municipal tenders are expected to appear soon. Foundries are operating at close to capacity and deliveries are greatly extended. The recent fire at Arverne, L. I., is expected to result in pipe purchases by the city for an improved water supply system. We quote per net ton, f.o.b. New York, in carload lots, as follows: 6-in. and larger, $50.80; 4-in. and 5-in., $55.50; 3-in., $65.80, with $4 additional for Class A and gas pipe.

Old Material.—The market is featureless. Few transactions are reported. In the absence of activity, prices are in most cases nominal. Buying is being done here for the Jones & Laughlin Steel Co. at $16.50, delivered Pittsburgh, for railroad steel. No. 1 machinery cast is reported to be slightly weaker. Buying by one mill of iron and steel car axles and shafting has caused an advance of these items of several dollars per ton. Steel car axles are quotable at $16 to $17 per ton, iron car axles at $22 to $23 per ton and shafting sales have been made on a basis of $15 per ton. Although the present market is quiet, there are no predictions of a decline and a renewal of activity is expected by many in July.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard	$9.50 to $10.00
Steel rails, short lengths, or equivalent	11.00 to 11.50
Rerolling rails	11.00 to 11.50
Relaying rails, nominal	27.00 to 28.00
Steel car axles	16.00 to 17.00
Iron car axles	22.00 to 23.00
No. 1 railroad wrought	12.50 to 13.00
Wrought iron track	11.00 to 11.50
Forge fire	8.00 to 8.50
No. 1 yard wrought, long	10.50 to 11.00
Cast borings (clean)	9.00 to 10.00
Machine-shop turnings	9.00 to 10.00
Mixed borings and turnings	9.00 to 10.00
Iron and steel pipe (1 in. diam., not under 2 ft. long)	9.00 to 9.50
Stove plate	9.75 to 10.25
Locomotive grate bars	11.50 to 12.00
Malleable cast (railroad)	10.00 to 10.50
Cast-iron car wheels	13.00 to 13.50

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast	$18.00 to $20.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	16.50 to 17.00
No. 1 heavy cast, not cupola size	13.00 to 13.50
No. 2 cast (radiators, cast boilers, etc.)	12.00 to 12.50

Warehouse Business.—June will probably be a quieter month than for some time. Deliveries from mills are reported to be increasingly poor. Prices are about the same with the exception of black and galvanized sheets, where an attempt at stiffening up quotations is evident, some dealers now quoting up to as high as 4.50c. and 5.50c. per lb., base, for black and galvanized, respectively, in small lots. Prices on these products, however, range down as low on fairly large lots, as 4.20c. and 5.20c. per lb., base. Dealers in wrought iron and steel pipe report firmer prices and a growing scarcity of butt weld steel pipe. While no change in

prices of steel pipe is expected, it is believed that the wrought iron schedule may be advanced later. Brass and copper warehouses have made no change in prices since June 1, and report an active market in material going into building construction. We quote prices on page 1798.

High Speed Steel.—There is a noticeable improvement in sales, which, however, are still of small quantities. Producers continue to quote 18 per cent tungsten high speed steel at 75c. to 80c. per lb. with special brands of some companies ranging up to 95c. per lb.

Philadelphia

Slight Falling Off in Demand for Pig Iron and Finished Steel—Prices Firm

PHILADELPHIA, June 20.

Many consumers seem to have become imbued with the idea in the past week or two that caution in buying is now a good policy. The generally accepted explanation in the trade for this attitude is the threatened strike of railroad shop mechanics. It seems probable that buyers are taking the possibility of a strike into serious account. On the other hand, a rumor that developments tending toward a sudden ending of the coal strikes may be expected within two or three weeks appears to have gained considerable circulation, leaving consumers again in a quandary as what effect this settlement, when it comes, will have on pig iron and steel prices. The expectation is that coal and coke would almost immediately become more plentiful and that there would be an easing off in iron and steel prices. Between these two possible developments there is a state of uncertainty that has been reflected in a lessened demand for the products of furnaces and mills. This situation seems particularly true in the East, but the mills which depend for a part of their tonnage on consumers in the Middle West report that business from that section is holding up much better than in the Atlantic seaboard territory. The continued demands of the automobile trade are largely accountable for this situation. Prices continue firm with any tendency toward change being upward.

Pig Iron.—About the lowest price foundry iron now coming into Philadelphia and hereabouts is from a furnace which is quoting $24.50 for No. 2 plain, $25.50 for No. 2X and $27 for No. 1X, with a freight rate of $1.82 to this point. A furnace interest closer to Philadelphia, which is selling in a limited way, asks $26 for No. 2 plain, $27 for No. 2X and $29 for No. 1X with an 84c. freight rate. Other active furnaces are either wholly or partly out of the market. Very little iron has been sold in this district in the past week, probably not more than a few thousand tons, and while pressure from consumers is not great, the price situation is strong and the tendency is toward higher levels. The coke situation is more serious with some furnaces, and two in this district, which up to this time have been getting along fairly well, are now confronted with fresh fuel developments which may force blowing out. The Matthew Addy Co., Real Estate Trust Building, which recently offered about 4000 tons of English foundry iron, has sold a part of this tonnage, and is now offering 3000 tons of French foundry iron, which will arrive in this country late in July. The French iron analyzes approximately the same as standard eastern Pennsylvania No. 2X except that the phosphorus runs to about 1.65 per cent. Steel-making grades of iron are inactive. On an inquiry for 1500 tons of gray forge quotations were as high as $30, furnace. The Alan Wood Iron & Steel Co. will put another furnace in blast within ten days, making three active stacks for this company. The Midvale Steel & Ordnance Co., which intended putting on a second furnace at Coatesville, has abandoned this plan until the coke situation becomes more certain. Supplement No. 27 to Freight Tariff No. 18-B has been issued, announcing a reduced rail and water rate from Southern furnaces to Philadelphia and other points. The new rate from Birmingham to Philadelphia by rail and water is $6.67 per ton, and on this rate a single carload of Alabama iron was sold a few days ago at $20.50, Birmingham, for 2.25 to 2.75 per cent silicon. Very little Virginia iron is now available and scarcely any is being sold.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 84 cents to $1.54 per gross ton.

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	$26.32 to $26.84
East. Pa. No. 2X, 2.25 to 2.75 sil.	27.32 to 27.84
East. Pa. No. 1X	27.32 to 29.84
Virginia No. 2 plain, 1.75 to 2.25 sil.	27.74 to 28.24
Virginia No. 2X, 2.25 to 2.75 sil.	28.24 to 28.74
Basic delivery eastern Pa.	25.00 to 25.50
Gray forge	24.00 to 25.00
Malleable	26.00 to 27.00
Standard low phos. (f.o.b. furnace)	30.00
Copper bearing low phos. (f.o.b. furnace)	30.00

Ferroalloys.—There has been a good deal of buying of English ferromanganese within the past week for July delivery at $67.50, seaboard. An intimation that the English price might be advanced to $70 may have been partly responsible, but the buying was also due to the anxiety of consumers to get covered before the new tariff rate goes into effect. Buyers seem hesitant about committing themselves beyong Aug. 1. Inquiries totaling several thousand tons are pending. Spiegeleisen is not active, but is quoted at $36, furnace.

Semi-Finished Steel.—Quotations are unchanged at $35, Pittsburgh, for open-hearth rerolling billets and $38 to $40, Pittsburgh, for forging quality.

Plates.—Although plates are obtainable at 1.60c., Pittsburgh, even for fairly prompt shipment, the market generally is stronger than this. One Eastern company has sold 2300 tons in the Pittsburgh district at 1.70c., Pittsburgh, and a like tonnage in the Cleveland district at the same basis. Some mills have taken no business in the past two weeks or more at less than 1.70c., but some buyers are covered until July 1 at lower figures, hence there is no large volume of buying at 1.70c. The Standard Oil Co. of New York inquired last week for 6500 tons in an apparent effort to determine whether a figure below 1.60c., Pittsburgh, could be obtained for early delivery. The best information the trade has is that the company was not successful. Shipbuilding companies in this district are figuring on several boats, three for the Eastern Steamship Co., requiring about 700 tons of plates each, and two for the Ocean Steamship Co., requiring a total of 3500 tons. We quote sheared and universal plates at 1.60c. to 1.70c., Pittsburgh.

Structural Material.—While most of the mills are quoting 1.70c., Pittsburgh, on plain material, one Eastern mill is quoting 1.60c. for good-sized tonnages, and in the past two weeks has booked close to 10,000 tons at this figure. Not many large projects are being figured, but there is a steady demand for small lots. Jobbers and fabricators have been buying for stock. We quote plain material at 1.60c. to 1.70c., Pittsburgh.

Bars.—An eastern Pennsylvania mill and a Buffalo mill have advanced their prices on soft steel bars to 1.80c., base, Pittsburgh. A few small sales have been made at this figure. Other mills quote 1.70c. and this seems to be the minimum for any tonnage. One lot of 3000 tons was sold last week for shipment into the Pittsburgh district at 1.70c., Pittsburgh. Bar iron demand is fair and prices are unchanged, 1.60c., Pittsburgh, for carload lots and 1.70c. for less than carloads.

Sheets.—The American Sheet & Tin Plate Co. is now taking business for all of third quarter and the expectation is that it will continue its present prices for all of that period. This has forced some of the independents to sell at the same price for forward delivery, but for early shipment premiums of from $2 to $5 a ton are being obtained. Quotations range from 2.40c. to 2.60c. on blue annealed, 3.15c. to 3.40c. on black and 4.15c. to 4.40c. on galvanized.

Bolts, Nuts and Rivets.—Third quarter contracts having been entered by most consumers and jobbers, some makers have advanced prices about 5 per cent. Third quarter contracts were generally made on the basis of 65 and 5 per cent off list for large machine bolts and the new discounts for current orders are 60 and 10 off list. Nuts are 4.50c. per lb. off list for all

varieties. Structural rivets are now quoted at 2.40c. per lb., Pittsburgh, and boiler quality at 2.50c.

Warehouse Business.—A fair demand for steel out of stock is reported. Prices for local delivery are as follows:

Soft steel bars and small shapes, 2.56c.; iron bars (except bands), 2.56c.; round edge iron, 2.75c.; round edge steel, iron finish, 1½ x ½ in., 2.75c.; round edge steel planished, 3.50c.; tank steel plates, ¼-in. and heavier, 2.66c.; tank steel plates, 3/16-in., 2.85c.; blue annealed steel sheets, No. 10 gage, 3.40c.; black sheets, No. 28 gage, 4.25c.; galvanized sheets, No. 28 gage, 5.25c.; square twisted and deformed steel bars, 2.65c.; structural shapes, 2.66c.; diamond pattern plates, ¼-in., 4.35c.; 3/16-in., 4.50c.; spring steel, 3.50c.; round cold-rolled steel, 3.20c.; squares and hexagons, cold-rolled steel, 3.70c.; steel hoops, No. 13 gage and lighter, 3.35c.; steel bands, No. 12 gage to 3/16-in., inclusive, 3.21c.; iron bands, 3.90c.; rails, 2.36c.; tool steel, 8c.; Norway iron, 5.50c.; toe calk steel, 4.50c.; tire steel, 2.65c.; planished tire steel, 3.40c.

Old Material.—Two Eastern mills are offering $15 for No. 1 heavy melting steel and another offers $15.25. Demand for other grades of scrap is not large and the market presents a weaker tone, which, however, is not definitely reflected in prices. Hyman, Michaels & Co., Pittsburgh, were high bidders for shells and shell steel offered last week by the War Department, their bid being $14.13, shipping point. As the material has a salvage value of about $3 a ton for brass and other metals which may be removed, this price means about $11.50, shipping point, for the steel scrap. We quote for delivery at consumers' works in this district as follows:

We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel	$15.00 to $15.50
Scrap rails	15.00 to 15.50
Steel rails, rerolling	17.00 to 17.50
No. 1 low phos., heavy 0.04 and under	22.00 to 24.00
Cast iron car wheels	17.00 to 18.00
No. 1 railroad wrought	17.00 to 17.50
No. 1 yard wrought	15.00 to 15.50
No. 1 forge fire	13.00 to 13.50
Bundled sheets (for steel works)	13.50 to 14.00
No. 1 busheling	15.00 to 15.50
No. 2 busheling	12.00 to 13.00
Turnings (short shoveling grade for blast furnace use)	13.50 to 14.00
Mixed borings and turnings (for blast furnace use)	13.50 to 14.00
Machine-shop turnings (for steel works use)	13.50 to 14.00
Machine-shop turnings (for rolling mill use)	14.00 to 14.50
Heavy axle turnings (or equivalent)	13.50 to 14.00
Cast borings (for steel works and rolling mills)	13.50 to 14.00
Cast borings (for chemical plants)	16.50 to 17.50
No. 1 cast	19.00 to 19.50
Railroad grate bars	14.50 to 15.00
Stove plate (for steel plant use)	15.00 to 15.50
Railroad malleable	15.00 to 15.50
Wrought iron and soft steel pipes and tubes (new specifications)	14.00 to 14.50
Shafting	20.00 to 20.50

Buffalo

BUFFALO, June 19.

Pig Iron.—Sales of foundry iron at $24, and quotations of $25, base, have been frequent, and all sellers are understood to have abandoned the $23 figure. One furnace has inquiry for 8000 tons and sold slightly more than 1000 tons. The greater portion of inquiry is for third and fourth quarter delivery and little is sought for immediate shipment. The majority of local sellers are disinclined to quote for fourth quarter delivery. The fuel situation cannot be said to be any more serious; one furnace has a sufficient supply on hand to operate on its present basis of two stacks, until Aug. 15. In the 8000 tons inquired for referred to above several 1000 and 2000-ton lots were included.

We quote f.o.b. per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil.	$24.00 to $24.50
No. 2X foundry, 2.25 to 2.75 sil.	23.50 to 24.00
No. 2 plain, 1.75 to 2.25 sil.	23.00 to 23.50
Basic	23.50
Malleable	22.00 to 23.00
Lake Superior charcoal	29.14

Finished Iron and Steel.—Efforts to buy are reaching the various sellers in greater number than in several weeks, but without exception the majority of selling agencies are unable to take any of the business. The minimum quotation on bars is 1.70c., Pittsburgh, but buyers are not as much interested in the price as they are in getting the material. Several mills in position to accept business have closed at 1.75c. and 1.80c. Structural demand, especially for small tonnages, is very brisk, but no large jobs have been awarded.

Warehouse Business.—Demand for all products increases daily and is due to inadequate mill operation and failure to obtain immediate deliveries. Prices are firm and the belief that a few products would be increased has disappeared. The character of present business is pleasing with reference to the number of orders as well as the size.

We quote warehouse prices, f.o.b. Buffalo, as follows: Structural shapes, 2.65c.; plates, 2.65c.; soft steel bars, 2.55c.; hoops, 3.30c.; bands, 3.15c.; blue annealed sheets, No. 10, 3.55c.; galvanized steel sheets, No. 28, 5.40c.; black sheets, No. 28, 4.40c.; cold-rolled strip steel, 6.95c., cold-rolled round shafting, 3.35c.

Old Material.—Mills have generally covered their wants and with the fact that there are no big stocks of old material on hand in the dealers' yards, the market is quiet. While the large buyers are not out of the market they are not inclined to take on any large tonnages with the price of heavy melting steel $16.50 to $17.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel	$16.75 to $17.00
Low phos., 0.04 and under	18.00 to 19.00
No. 1 railroad wrought	16.00 to 16.50
Car wheels	17.00 to 18.00
Machine shop turnings	10.50 to 11.00
Cast iron borings	12.50 to 13.00
Heavy axle turnings	14.00 to 14.50
Grate bars	14.00 to 14.50
No. 1 busheling	15.00 to 15.50
Stove plate	15.00 to 15.50
Bundled sheet stampings	11.50 to 12.00
No. 1 machinery cast	18.00 to 18.50
Hydraulic compressed	15.00 to 15.50
Railroad malleable	17.00 to 17.50

Birmingham

BIRMINGHAM, June 20.

Pig Iron.—A dull iron market week was that closing June 17. The largest active maker styled sales as "desultory" with largest booking 500 tons for Southern delivery at $18.50. This maker, which has river and rail iron, is alone on the $18.50 base. Two producers are on a $20 base and each has made sales, although a few only, at that price. One order was for 300 tons for St. Louis for fourth quarter at $20 and four others were carloads at same price for spot delivery. The next to the largest active interest is out of the market and, where customer insists on booking, makes the price $20. Very little has been done at that level. Inquiry has been sparse and there has been an occasional request to delay delivery until July 1. Pipe makers, although at full operation, are well supplied for the remainder of the third quarter and show small interest in the current market. Small consumers in and around Birmingham have been paying $19 for some time for carloads and slightly larger tonnages. Makers report nothing going to yards, where minimum stocks were found on June 1. The Tennessee company is planning resumption of Bessemer No. 4 at an early date first on foundry iron and then on ferromanganese. The first cargo of 30,000 to 40,000 tons of Brazilian ore is expected, it is understood, toward the last of June. The Tennessee company now has one stack on foundry iron to produce large orders taken from high pressure pipe makers. Iron makers declare the market has not weakened by the let-up in purchasing and are holding firmly for their several bases with apparent confidence that fourth quarter business will be done on a $20 level.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, silicon 1.75 to 2.25	$18.50 to $20.00
Basic	18.50 to 19.00
Charcoal, warm blast	30.00 to 32.00

Cast Iron Pipe.—Both pressure and sanitary pipe markets are strong at bases, respectively, of $37 and $55. Wages of Anniston pipe workers have been advanced 10 per cent. The National Cast Iron Pipe Co. has booked 1600 tons for Cedar Rapids, Iowa, and the United States Cast Iron Pipe Co., 1000 tons for Springs Wells, Mich. The largest sanitary pipe interest is out of market. Shops remain at full or near full operations.

Finishing Mills.—The Tennessee company, at maximum production of steel, finds it more and more difficult to make prompt deliveries. Finishing mills are on double turn. The company announces the construction of a modern steel foundry at the Fairfield works and 500 lockers for employees and will remodel the foundry at Ensley to facilitate the manufacture of ingot molds and iron castings. Hoop and wire mills are on full turn and exporting. Wire drawing mills have about all they can handle. The same is true of structural steel. Tank makers are extremely busy. Galvanized sheets are in brisk demand. Argentine has recently taken hoops, bands and fence wire as well as angle bars.

Coal and Coke.—Chicago has taken 50,000 tons of Alabama coal at $4 special freight rate, and one large coke maker has booked a considerable tonnage of coke there at the $4.77 freight rate. Western business in Alabama coal is increasing. The base remains at about $2, Pratt seam. Coke rules at $5 to $6.

Old Material.—The scrap market is stronger with No. 1 steel finally responding to a wider scope of demand. It is now realizing the quoted prices, which have been shaded heretofore $1 and $2 a ton for quantities. Stove plate is in good demand. Quoted prices are realized and higher ones anticipated. We quote per gross ton f. o. b. Birmingham district yards as follows:

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails	$13.00 to $14.00
No. 1 steel	12.00 to 13.00
No. 1 cast	14.00 to 15.00
Car wheels	13.00 to 14.00
Tramcar wheels	12.00 to 13.00
Stove plate	12.00 to 13.00
Cast iron borings	6.00 to 7.00
Machine shop turnings	4.00 to 5.00

St. Louis

ST. LOUIS, June 20.

Pig Iron.—The market for pig iron continues strong, with further advances in Southern makes constituting the principal feature of last week's market. A price of $20 has been made by all of the principal producers, except the Sheffield maker, which is still quoting $18.50, Birmingham, for either water or rail rate. This company made the principal sales of the week, 2000 tons to an Indiana stove concern and 400 tons to a St. Louis foundry, at the lower price. Southern makers are well sold up and feel that the continued demand and the costs of production justify higher prices. The market for Northern iron continues at $23, Chicago. Except as noted, sales for the week were largely confined to carloads up to 100 tons, but reached a good volume. That there has been a conservative tendency in buying is shown by the fact that most users are asking that shipments be made promptly, as they need the iron, rather than waiting until July 1 to get the benefit of lower freight rates then in effect. The principal pending inquiry is from Kewanee, Ill., for 1200 tons of 2.75 to 3.25 per cent silicon, 1500 tons of 2.25 to 2.75 silicon, and 800 tons of 1.75 to 2.25 silicon foundry iron, and 1500 tons of malleable from 1.50 to 2.25 per cent silicon, all for fourth quarter shipment. The ferroalloys are quiet.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices $2.40 freight from Chicago and $5.74 from Birmingham and 90 cents average switching charge from Granite City:

Northern foundry, sil. 1.75 to 2.25	$25.40
Northern malleable, sil. 1.75 to 2.25	25.40
Basic	25.40
Southern foundry, all rail, sil. 1.75 to 2.25	$24.24 to 25.74
Southern foundry, water and rail, sil. 1.75 to 2.25, f.o.b. St. Louis	22.74

Finished Iron and Steel.—Local fabricators are busily engaged, the larger ones being well supplied on their requirements, although the smaller concerns are buying where they can in carload lots up to 50 tons, the sales being in fairly large volume. The general contract for the branch of Federal Reserve Bank building at Little Rock, Ark., has been awarded to Ault & Burden of that city. Only one inquiry of note came from the railroads last week, that being issued by the Southwestern region of the Pennsylvania System and was for 100,000 tie plates for 100 lb. rails. Most of the mills are disinclined to take on any more orders because of being oversold. Warehouses prices of plates, shapes and bars have been advanced 0.10c. per lb., and prices of other items have been increased.

For stock out of warehouse we quote: Soft steel bars, 2.57½c. per lb.; iron bars, 2.57½c.; structural, shapes 2.67½c.; tank plates, 2.67½c.; No. 10 blue annealed sheets, 3.72½c.; No. 28 black sheets, cold rolled, one pass, 4.45c.; cold drawn rounds, shafting and screw stock, 3.50c.; structural rivets, $3.19½ per 100 lb.; boiler rivets, $3.29½; tank rivets, 7/16 in. and smaller, 60 per cent off list; machine bolts, large, 50 and 10 per cent; small, 50-10 and 10 per cent; carriage bolts, large, 55-5 per cent; small, 60 and 10 per cent; lag screws, 60 per cent; hot pressed nuts, square or hexagon blank, $3.50; and tapped, $3.25 off list.

Coke.—The demand for coke continues strong, and consumers are urging prompt shipment. It is expected that there will be still heavier buying after July 1, when lower freight rates become effective. As the coal situation becomes more acute, strength is added to the coke market.

Old Material.—The summer lull seems to pervade the old material market. Re-rolling grades are rather weak, as users are well loaded up with all the material they can use for some time. In addition to that their storage space is congested with coal supplies, and they cannot take on any tonnage of old material so that the question of price fails to interest them. Melting steel is not in demand, as the Scullin Steel Co., one of the largest active buyers, is out of the market. Borings are scarce and in good demand.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton

Old iron rails	$16.75 to $17.25
Steel rails, rerolling	14.00 to 14.25
Steel rails, less than 3 ft	15.00 to 15.50
Relaying rails, standard section	25.00 to 28.00
Cast iron car wheels	17.00 to 17.50
No. 1 railroad heavy melting steel	13.00 to 13.50
No. 1 heavy shoveling steel	12.50 to 13.00
Ordinary shoveling steel	12.50 to 13.00
Frogs, switches and guards, cut apart	13.50 to 14.00

Per Net Ton

Heavy axle and fire turnings	9.50 to 10.00
Steel angle bars	12.75 to 13.25
Iron car axles	23.00 to 23.50
Steel car axles	16.50 to 17.00
Wrought iron bars and transoms	18.00 to 18.50
No. 1 railroad wrought	12.25 to 12.75
No. 2 railroad wrought	11.75 to 12.25
Railroad springs	15.00 to 15.50
Steel couplers and knuckles	15.00 to 15.50
Cast iron borings	9.25 to 9.50
No. 1 busheling	11.00 to 11.50
No. 1 railroad cast	15.50 to 16.00
Stove plate and light cast	12.75 to 13.25
Railroad malleable	12.75 to 13.25
Pipe and flues	8.00 to 8.50
Machine shop turnings	6.50 to 7.00

Boston

BOSTON, June 20.

Pig Iron.—Buffalo furnace interests not regularly represented here are offering iron in this territory at prices considerably under those quoted by others and are securing some attractive tonnages. Pennsylvania furnace interests, with a high freight into New England, also are offering iron at attractive prices and are getting some business in iron of silicons of 1.75 to 2.25, 2.25 to 2.75 and 2.75 to 3.75 per cent. Eastern Pennsylvania, Virginia and Alabama irons therefore have not been much of a factor in this territory. A local foundry is reported to have purchased 1000 tons of 1X at $26.75 delivered and also 200 tons Pennsylvania malleable at around $28 delivered. A New Hampshire foundry has closed on 850 tons, silicon 2.25 to 2.75, of Pennsylvania iron at $22, furnace, and is negotiating with Buffalo representatives for additional tonnages. Where concessions are made, delivery is for third quarter, and furnaces evidently took into consideration freight rate reductions when making a price. Buffalo interests regularly represented here continue to quote at a base of $23 to $25, furnace, with regular differentials. Consequently an unusually wide spread in prices exists. The General Fire Extinguisher

Co., Providence, R. I., decided not to purchase iron at this time, an inventory disclosing the fact the company had sufficient on hand to last the rest of 1922, based on present operations.

We quote delivered at common New England points as follows, having added to furnace prices $4.06 freight from eastern Pennsylvania, $5.46 from Buffalo and $10.66 from Alabama:

East. Penn., sil. 2.25 to 2.75	$28.56 to $29.56
East. Penn., sil. 1.75 to 2.25	28.06 to 29.06
Buffalo, sil. 2.25 to 2.75	26.96 to 30.96
Buffalo, sil. 1.75 to 2.25	26.46 to 30.46
Alabama, sil. 2.25 to 2.75	29.66 to 30.16
Alabama, sil. 1.75 to 2.25	29.16 to 29.66

Warehouse Business.—Local warehouse prices on steel bands have been advanced from $3.25½ to $3.50 per 100 lb., and on steel hoops from $3.66½ to $4. Bands are now 59½c. above the low point of 1922 and higher than they have been since July 8, 1921, when they sold at $3.63. Hoops are 68½c. above the 1922 low point and highest since Oct. 5, 1921. Norway iron rounds have been marked up from $5.75 to $6 per 100 lb. and squares and flats from $6 to $6.50, the highest price quoted since August, 1921. Iron and steel quotations otherwise are unchanged but very strong, due to a continued good demand from consumers and deferred mill shipments. Bolt and nut values also are strong and the demand shows no sign of diminishing. Washers, rivets and nails are moving in a satisfactory manner. Warehouse prices on iron and steel follow:

Jobbers quote: Soft steel bars, $2.60½ per 100 lb. base; flats, $3.25½; concrete bars, $2.75 to $2.88; structural steel, $2.60½ to $2.70½; tire steel, $4 to $4.35; open-hearth spring steel, $4.50 to $6; crucible spring steel, $11.50; steel bands, $3.50; hoop steel, $4; cold rolled steel, $3.30 to $3.80; refined iron, $2.60½; best refined iron, $4.25; Wayne iron, $5.50; Norway iron, $6 to $6.50; plates, $2.70½ to $2.87½; No. 10 blue annealed sheets, $3.40½ to $3.63 per 100 lb. base; No. 28 black sheets, $4.90; No. 28 galvanized sheets, $5.90.

Coke.—The market for by-product foundry coke is firm and unchanged at $11 delivered on contract and at $11.50 on spot. It was intimated last week by one producer that spot coke might be advanced, but no change materialized. The company's failure to take such action does not indicate any relaxation in the situation, however. The two producers in this territory are sold up for the third quarter, and their output for the last quarter is largely contracted for. New buying by New England foundries as a rule is confined to small tonnages of spot coke. The movement of foundry fuel to points outside of New England continues quite heavy.

Old Material.—Dealers report quite a falling off in business this week and some shading of prices. Rejections by Pennsylvania and New England mills also are growing more numerous and, in a few instances, consumers are requesting shipments be held up until after July 1. Ruling market conditions are generally attributed to the forthcoming adjustment in freight rates. Contrasted with a week ago, heavy melting steel, wrought pipe, machine shop turnings and blast furnace borings and turnings are 25c. to 50c. per ton lower. Cast iron borings, both rolling mill and chemical, and forged scrap and bundled skeleton values hold well, these materials being practically the only ones in which interest exists at the moment. Sales of No. 1 machinery cast in carload lots at $19 to $20 delivered are noted, but the average New England user is still able to fill requirements from local sources. Stove plate is in demand at $13.50 delivered New England points, but holders are not anxious to sell at that figure.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast	$19.00 to $20.00
No. 2 machinery cast	17.00 to 18.00
Stove plate	13.50 to 14.00
Railroad malleable	15.00 to 15.50
Street car wheels	18.00 to 19.00

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$10.00 to $10.50
No. 1 railroad wrought	11.50 to 12.00
No. 1 yard wrought	10.00 to 10.50
Wrought pipe (1 in. in diam., over 2 ft. long)	8.00 to 8.50
Machine shop turnings	7.75 to 8.00
Cast iron borings, rolling mill	8.50 to 9.00
Cast iron borings, chemical	10.50 to 11.00
Blast furnace borings and turnings	7.75 to 8.00
Forged scrap and bundled skeleton	8.00 to 8.50
Street car axles and shafting	14.50 to 15.00
Rerolling rails	11.00 to 11.50

Cincinnati

Pig Iron Firm, with Southern Ohio Higher—Heavy Demand for Furnace Coke

CINCINNATI, June 20.

Pig Iron.—Some fair-sized sales were reported in the week, but as a general thing the market was rather quiet. What little inquiry is out is for third quarter iron, and to judge by the reports from furnaces the available tonnage is rather small. It is expected that when freight rate reductions are actually in effect, there will be an increased demand for pig iron, as the policy of the melters to date has been to cover only for a short period ahead. The biggest sale reported was for 3250 tons of Bessemer iron made by a southern Ohio furnace to an Ohio Valley steel maker for June shipment. The same interest is expected to buy 3000 tons for July shipment, as coke shortage is handicapping its blast furnace activities. A stove foundry in southern Ohio bought 500 tons of Northern iron for third quarter at $23.50, Ironton furnace. An Indianapolis melter took 1000 tons of Southern iron, and a northern Ohio melter a similar tonnage at $18.50, Birmingham. We also note sales of 500 tons of charcoal and 500 tons of silvery iron to a Michigan melter at the regular schedules. Scattering lots of 100 to 300 tons were booked by both Northern and Southern furnaces. But the aggregate was rather light. Inquiries include one for 600 tons of malleable from Toledo, 700 tons of foundry iron from Dayton for fourth quarter, 500 to 1000 tons of low phosphorus iron from a central Ohio steel foundry, and 300 to 500 tons of foundry for an eastern Indiana melter. Prices are firm, southern Ohio furnaces having advanced 50c. on foundry, malleable and Bessemer. The Southern market remains at $18.50, minimum, with $20 being quoted against third quarter orders by a number of furnaces.

Based on freight rates of $4.50 from Birmingham and $2.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	$23.00
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	23.50
Ohio silvery, 8 per cent	35.02
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	26.02
Basic Northern	26.52
Malleable	26.52

Fluorspar.—A number of sales of fluorspar were made to steel mills in this district, one involving 600 tons and another 300 tons. Prices are firm, ranging from $16 to $17.50, the latter for guaranteed material.

Finished Material.—The American Sheet & Tin Plate Co. has now opened its books for entire third quarter at 2.40c., 3.15c. and 4.15c. for blue annealed, black and galvanized sheets respectively. Tin plate prices were recently announced for third and fourth quarter deliveries. Independent mills are quoting generally $3 a ton higher on sheets, and are closing on some fair tonnages. The Steel Corporation's subsidiary is booking at a heavy rate. The demand for bars, shapes and plates for third quarter is also becoming quite heavy, but the disposition of the mills seems to be to go slow in contracting. Tank manufacturers in this district are running practically to capacity, and the number of structural jobs being awarded has created a fair demand for shapes and reinforcing bars. Wire products are moving in fair volume, with mill deliveries falling behind. Nails are firm at $2.40, Pittsburgh, and it is expected that this price will continue for third quarter. Demand for semi-finished materials is active, and it is said that Valley finishing mills are seeking to place orders for billets and sheet bars with southern Ohio mills. New inquiries in the structural field are few, but this week will see the awarding of quite a tonnage on projects which came to a head around June 15. Prices on all steel products are firm, but advances over last week's quotations are few and only of minor importance.

Tool Steel.—The demand for tool steel is improving steadily, the month to date being the best one for a year and a half. Prices are firm and unchanged, 18 per cent tungsten high speed steel being quoted at 75c. per lb.

Warehouse Business.—Local jobbers are enjoying a very brisk season, and stocks are being depleted at a rapid rate. Advances have been made on bolts and nuts, but on other products prices remain as last quoted.

Jobbers quote: Iron and steel bars, 2.75c. base; hoops, 3.60c.; bands, 3.35c. base; shapes and plates, 2.85c. base; reinforcing bars, 2.82½c. base; cold-rolled rounds, 3.35c. base; flats, squares and hexagons, 3.85c. base; No. 10 blue annealed sheets, 3.60c.; No. 28 black sheets, 4.50c.; No. 28 galvanized sheets, 5.50c.; No. 9 annealed wire, $2.70 per 100 lb.; common wire nails, $2.85 per keg, base.

Coke.—The demand for furnace coke is heavy, with practically no beehive coke available. Domestic coke is moving well, but a falling off in foundry grades is reported. Prices are very strong, and some districts have marked prices up 50c. per ton. We note inquiries for 50 cars of furnace coke, and 5000 tons of gas coke for third quarter shipment.

Old Material.—There is fair activity in the local scrap market, which is reported as stronger than last week, owing to better demand from outside districts. However, no price changes have been made, but a swing upward is confidently expected.

We quote dealers' buying prices, f.o.b. cars:

Per Gross Ton		
Bundled sheets	$8.00 to	$8.50
Iron rails	13.50 to	14.00
Relaying rails, 50 lb. and up	26.50 to	27.00
Rerolling steel rails	13.50 to	14.00
Heavy melting steel	13.00 to	13.50
Steel rails for melting	13.00 to	13.50
Car wheels	14.50 to	15.00
Per Net Ton		
No. 1 railroad wrought	11.50 to	12.00
Cast borings	8.50 to	9.00
Steel turnings	7.50 to	8.00
Railroad cast	14.00 to	14.50
No. 1 machinery	16.00 to	16.50
Burnt scrap	9.50 to	10.00
Iron axles	18.00 to	18.50
Locomotive tires (smooth inside)	11.00 to	11.50
Pipes and flues	6.50 to	7.00

Cleveland

Ore Buying Limited as Yet—Fair Pig Iron Demand—Bolts and Nuts Higher

CLEVELAND, June 20.

Iron Ore.—There has been a rather limited amount of open market buying of iron ore since prices for the season were established, but sellers have devoted their attention largely to closing up contracts with consumers having connections with mining companies, many of whom made reservations before prices were named. However, quite a number of open market sales have been made in lots of 50,000 tons and over. One interest has sold several lots aggregating about 250,000 tons and another expects to close a contract to-day for one lot of 200,000 tons or more. The demand so far from open market buyers appears to run largely to manganiferous ores. Consumers having long time contracts with mining companies in which they are interested generally will take this season the full tonnages specified in their contracts. Last year in most cases requirements were scaled down materially and some consumers took no ore on their contracts. Ore firms do not expect to sell any Lake Superior ore in the East this season, as with the present price it cannot compete with foreign ore. Mesabi non-Bessemer ore running 51.50 per cent iron selling at the base price of $5.05 will cost the Eastern consumer approximately $7.07 per ton delivered or 13.728c. per unit as compared with a price of 10.5c. per unit for foreign ore. On this basis Lake Superior ore will cost the Eastern consumer $1.65 per ton more than foreign ore, but it may be that foreign ore can be bought at considerably less than 10.5c. per unit. A sale was recently reported of a cargo of foreign ore in the eastern market at 7½c. per unit. While no sales to Eastern furnaces are expected, some Lake Superior ore will be shipped to these furnaces on old contracts. Two Eastern consumers still have considerable ore due on 1920 contracts, shipments of which were suspended. The freight reductions on ore from the mines to the upper lake ports were placed in effect yesterday, some of the railroads which had previously announced that these reductions would become effective July 1 having changed the date to June 19 to correspond with the date named by one of the ore carrying railroads. In making up the new tariffs the railroads instead of making a 10 per cent reduction on the $1 rate that includes handling charge, made the reductions only on the line haul of 90c. and 95c., making the new rate from all districts except the Marquette range 91c. instead of 90c., as had been expected. With the establishment of ore prices and the rail rate reductions at both ends of the Lake, shipments are increasing materially and a heavy movement is expected during the remainder of the season. With water shipments only slightly over 1,700,000 tons up to June 1 and a very light movement during the first half of June, shipments will have to be heavy during the remainder of the season to bring down a total of 45,000,000 tons of ore, which is estimated to be the season's requirements.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, $5.95; Old range non-Bessemer, 51½ per cent iron, $5.20; Mesabi Bessemer, 55 per cent iron, $5.70; Mesabi non-Bessemer, 51½ per cent iron, $5.05.

Pig Iron.—Demand continues fair, although there seems to be a disposition among some consumers to buy only for July requirements. They feel that should there be an early settlement of the coal strike pig iron prices may sag. Others are buying through the third quarter and a limited amount of business is being booked for the fourth quarter. Michigan automobile foundries are still buying considerable iron but they are following a conservative policy and not placing orders for extended future delivery. Lake furnaces report an increase in the Eastern demand in small lot orders. Prices are firm and unchanged at $23 to $24, Lake furnaces, for foundry iron, the higher price being the usual quotations for local delivery. One Lake furnace reports sales during the week aggregating 8000 tons, mostly in small lots, the largest orders being 700 tons, each, of foundry and malleable iron. One Cleveland producer sold in the week 2000 to 3000 tons. Inquiry is still coming out in fair volume. The Westinghouse Electric & Mfg. Co. is inquiring for 1000 tons of iron for July shipment for its Cleveland plant and is credited with the purchase of 700 tons for its Pittsburgh plant. Another Pittsburgh consumer is inquiring for 1000 tons of foundry iron for the last half. The U. S. Malleable Iron Co., Toledo, Ohio, has an inquiry out for 600 tons of malleable iron. Basic iron is inactive. The demand for low phosphorus iron is showing more life. We note sales of 500 and 300 tons at $34 and two 500-ton lot inquiries are pending. We note the sale of 150 tons of Bessemer iron at $25. Interest is taken in the reported possibility of the re-establishment by the Southern railroads of the 1918 freight rates on Southern pig iron which will mean reductions of $6.67 to $4.81 for shipment into this territory instead of the 10 per cent reduction that has been ordered.

Several sales of foundry iron aggregating 2500 tons for shipment from Cleveland to the Pittsburgh district were made on basis of $24 Valley.

Quotations below are f.o.b. local furnace for Northern foundry iron, not including a 56c. switching charge. Other quotations except basic are delivered Cleveland, being based on a $1.98 freight rate from Valley points, a $3.36 rate from Jackson and a $6.67 rate from Birmingham:

Basic, Valley furnace		$25.00
Northern No. 2 fdy., sil. 1.75 to 2.25	$23.00 to	24.00
Southern fdy., sil. 1.75 to 2.25		25.17
Ohio silvery, sil. 8 per cent		33.86
Standard low phos., Valley furnace	34.00 to	35.00

Alloy Steels.—Automobile manufacturers have placed a good volume of orders for alloy steels for July shipment. While regular prices are unchanged some buyers claim that they are being given quotations of ¼c. per lb. below regular prices. These prices are 4½c. per lb. for chrome nickel steel, 5c. per lb. for chrome vanadium steel and 5¼c. per lb. for 3½ per cent nickel steel.

Bolts, Nuts and Rivets.—Leading Cleveland bolt and nut makers on June 17 advanced prices 5 to 10 per cent to the higher quotations that were put in effect by some of the Pittsburgh makers ten days previously. However, before the advance some of the manufacturers covered their customers with contracts at the old prices. The demand continues good. Rivet manufacturers report a good volume of orders in small miscellaneous lots and many consumers are placing third quarter contracts. Prices are firm at the recent advance.

Semi-finished Steel.—Demand has become less active, although a Cleveland mill sold about 5000 tons of sheet bars during the week at $35 and continues to quote billets and slabs at the same price. Sales of small lots of forging billets are reported at $41 to $42, Pittsburgh.

Finished Material.—A slackening demand, particularly for steel bars, is not surprising in view of fact that most consumers in the manufacturing field are covered with contracts for their requirements for some time. Some mills have gotten further behind on deliveries on plates and structural material, being unable to make shipments within three or four months, or as far behind as on steel bars. Prices are firm and there are indications that the minimum 1.60c. price on steel bars, plates and structural material, which is now to be had only for extended deliveries, will be advanced to 1.70c. July 1. For early shipment 1.70c. is the minimum price and small lot sales are being made at 1.80c. and on heavy plates an occasional car load order is being booked at 2c. On light plate quotations range from 2c. to 2.10c. An inquiry has come from the Magnolia Petroleum Co. for five tanks requiring 1250 tons of plates. Inquiry in the building field is less active although considerable work is pending. For construction work in Pittsburgh 500 tons of sheet piling is wanted. Hard steel reinforcing bars are in good demand with prices showing a stiffening tendency. One Ohio mill is now quoting re-rolling bars at 1.65c. at mill. A Pennsylvania mill is still on the 1.60c. base but has advanced its price to 1.70c. for less than car lots. The Cuyahoga County Commissioners, Cleveland, have an inquiry out for railroad grade crossing elimination work requiring 230 tons of reinforcing bars. Hoops and bands are higher with 2.40c. the minimum quotation, and sales in good sized lots are reported at 2.60c.

Jobbers quote steel bars, 2.41c.; plates and structural shapes, 2.51c.; No. 9 galvanized wire, 3c.; No. 9 annealed wire, 2.50c.; No. 28 black sheets, 3.90c. to 4c.; No. 28 galvanized sheets, 4.90c. to 5c.; No. 10 blue annealed sheets, 3.15c. to 3.25c.; hoops and bands, 3.06c.; cold-rolled rounds, 3.20c.; flats, squares and hexagons, 3.70c.

Coke.—The demand for foundry coke in car lots is more active but the supply is scare. Connellsville foundry coke for prompt shipment is quoted at $7.50 per net ton. Consumers are asking that shipments of Virginia coke be advanced, evidently fearing the railroad strike. Indianapolis by-product coke is quoted at $7.50 at oven, making the Valley delivered price $11.28, which furnaces are not inclined to pay.

Old Material.—Weakness has developed in the market which is unusually dull. In the absence of transactions quotations show virtually no change. Mills are keeping out of the market and all seem to have liberal supplies of scrap. Dealers generally have covered on recent sales and probably will do little trading until consumers again come in the market.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel	$15.25 to $15.50
Steel rails, under 3 ft	15.75 to 16.00
Steel rails, rerolling	16.00 to 16.50
Iron rails	14.00 to 15.00
Iron car axles	18.00 to 19.00
Low phosphorus melting	16.00 to 16.25
Cast borings	12.50 to 12.75
Machine shop turnings	11.50 to 12.00
Mixed borings and short turnings	12.50 to 12.75
Compressed steel	12.85 to 13.25
Railroad wrought	14.00 to 14.50
Railroad malleable	15.50 to 16.00
Light bundled sheet stampings	10.00 to 10.25
Steel axle turnings	13.00 to 13.50
No. 1 cast	17.00 to 17.50
No. 1 busheling	11.25 to 11.75
Drop forge flashings over 10 in.	11.00 to 11.50
Drop forge flashings under 10 in.	11.25 to 11.75
Railroad grate bars	14.00 to 14.50
Stove plate	14.00 to 14.50
Pipes and flues	11.00 to 11.50

Sheets.—There is considerable irregularity in quotations by independent mills. A number are now booking orders for the third quarter. While 2.55c. is the most common independent mill price on blue annealed sheets, at least one mill has quoted 2.50c. and another has gone to 2.40c. on round lots. Galvanized sheets appear plentiful at 4.15c. for the third quarter but black sheets seem firmly held by independent mills at 3.30c. Considerable business in automobile body sheets is being booked for third quarter at 4.75c. The Ford Motor Co. has placed 1000 tons additional in frame stock for July delivery.

Warehouse Business.—Sales continue large and a shortage has developed in steel bars in sizes mostly in demand. The leading jobbers have advanced sheets $2 a ton.

San Francisco

SAN FRANCISCO, June 7.

Pig Iron.—Business has been moderately active during the past two weeks, chiefly in foreign material. Around 2000 tons of Middlesborough iron was contracted at a price of close to $29, delivered Pacific Coast ports. Importers are offering liberally, both English and Belgian, and the market has appeared somewhat easier as a result. Firmer Belgian exchange recently has exerted a tendency to a slight reaction, but this has not become very definite yet. It is understood that offerings of Belgian iron have been made lately at about $29, ex ship San Francisco; no appreciable quantities have been sold at that figure. Around 500 tons of Shotts iron was offered at $27.50, c.i.f. San Francisco, but as far as known there have been no takers.

Coke.—An inquiry from the Southern Pacific Co. for 1200 tons is the best prospect of recent date. Importers are offering foreign coke here in good quantities, but actual business is confined to small parcels. English material is quoted around $18, ex ship Pacific Coast points. There is only a moderate buying of domestic coke, consumers appearing to be awaiting an attractive reduction in freight rates. Birmingham coke is at about $6.50, f.o.b. ovens, while West Virginia material is offering around $8.50.

Old Material.—This market continues quiet and steady. Business is of a routine nature, with no appreciable increase in consumption. Prices are unchanged at $9.50 to $10 on heavy melting steel, delivered at consumers' works, and from $21 to $22 on cast iron scrap.

Cast-Iron Pipe.—Price firmness during the past fortnight has been the feature of the pipe situation on the Coast. The base has been moved upward about $3, so that the delivered price now is close to $54. Cast-iron soil pipe and fittings are oversold heavily, and the market is very firm, with the fifth advance since March 21 taking place on June 3. The level is now 40 per cent off list on a basis of $60. For this class of material there is an active demand. Municipal prospects remain rather quiet throughout the State, but it is estimated that about 1200 tons will come up before the end of the month, mainly from the Southern area.

Finished Iron and Steel.—A relatively satisfactory condition prevails in the Coast market, with a gradual broadening of activities and a closer approximation to price stability. Firmness is characteristic of every item. While unusual features do not mark the situation at the moment, the movement of practically every class of material is steady and in good volume. Jobbers are buying liberally for consumptive needs and shops are taking for stock. There is little change in the prices of bars, plates and shapes, both merchant and reinforcing bars being still quoted at $2.55, while plates and shapes are offered at around $1.85, mill, or about $2.40, delivered. Sheets are being maintained at $4.15 for galvanized (immediate specifications), $3.15 for black and $2.50 for blue annealed. Bolts and nuts are moving freely in carloads, jobbers specifying their full quotas for the remaining period of the quarter, in anticipation of further advances. Oil field work continues steady, and it is estimated that around 3000 tons have been contracted within a month's time. Perhaps the most conspicuous prospect is the Alaska Engineering Commission's order for 1100 tons of 70-lb. rails for its Alaska lines. Bids open to-day. Another is the Los Angeles Board of Harbor Commissioners' job for steel for the construction of two new slips at San Pedro. The contract has not yet been awarded. About 625 tons of rails and fittings is involved.

FABRICATED STEEL BUSINESS

Bridge and Building Awards and Tonnages Pending at Leading Centers

Awards for fabricated steel work for the past week were as follows:

Loft building on West Twenty-sixth Street, New York, 500 tons, to Hay Foundry & Iron Works.

Loft building at Madison Avenue and Twenty-eighth Street, New York, 500 tons, to Hinkle Iron Co.

Bridge for New Haven, Conn., 1400 tons, Phoenix Bridge Co., low bidder.

Gymnasium building at Lafayette College, Easton, Pa., 400 tons, to Lehigh Structural Steel Co.

Power plant for East Penn Power Co. at Pine Grove, Pa., 1000 tons, to Shoemaker-Satterthwait Bridge Co.

Freeport Sulphur Co., Freeport, Tex., 400 tons, to Virginia Bridge & Iron Works.

Apartment building, Broadway and 104th Street, New York, 1000 tons, to A. E. Norton, Inc.

Sixty-five 80,000-bbl. oil tanks for Sinclair Consolidated Oil Corporation, 18,000 tons of plates; 50 awarded to Chicago Bridge & Iron Works and 15 to Phoenix Iron Co., Meadville, Pa.

Highway bridge at Boston, 700 tons, to Boston Bridge Works.

Apartment building, Syracuse, N. Y., 200 tons, to unnamed fabricator.

State hospital building in Brooklyn, 200 tons, to Easton Structural Steel Co.

Housing station and destructor building, Street Cleaning Department, New York, 700 tons, to A. E. Norton, Inc.

Office buildings for A. I. Jordan, Chicago, 1215 tons, to American Bridge Co.

Auditorium and market house, Memphis, Tenn., 1896 tons, to Virginia Bridge & Iron Co.

Glen Lake Sanitarium, addition, Oak Terrace, Minn., 363 tons, to Crown Iron Works.

Community memorial house, Whiting, Ind., 267 tons, to unnamed fabricator.

Elks' Club, Springfield, Ill., 670 tons, to American Bridge Co.

First National Bank building, Ironton, Ohio, 315 tons, to Fort Pitt Bridge Works.

Extension, Broadway viaduct, Denver, Col., 1700 tons, to American Bridge Co.

Water tank, Lewiston, Mont., 180 tons, to Chicago Bridge & Iron Works.

North High School, Columbus, Ohio, 600 tons, R. H. Evans & Co., Columbus, low bidder on general contract.

Washington-Gladden High School, Columbus, Ohio, 500 tons steel, 300 tons reinforcing bars, R. H. Evans & Co., low bidder on general contract.

Bridge work for Big Four Railroad and subsidiaries, King Bridge Co., low bidder on approximately 900 tons; Fort Pitt Bridge Co. low bidder on 300 tons.

Gas holder at Des Moines, Iowa, 1500 tons, to Stacey Mfg. Co., Cincinnati, which also has closed on 400 tons of miscellaneous gas holders, purifiers and water tanks.

American Legion Memorial Building, Independence, Kan., 400 tons, to Mississippi Valley Structural Steel Co.

Hens and Kelly department store, Buffalo, Buffalo Structural Steel Co., low bidder.

Willis K. Jackson Building, Buffalo, 900 tons, to Jones & Laughlin Steel Co., low bidder.

Lincoln Storage & Warehouse Co., Milwaukee, to Haskendahl & Schmidt Co., Milwaukee.

Coke quenching stations for the McKinney Steel Co., Cleveland, 170 tons to the American Bridge Co.

Office building, Greensboro, N. C., 1500 tons, to Virginia Bridge & Iron Works.

Stratford office building, Chicago, 9000 tons, to Morava Construction Co.

Structural Projects Pending

Inquiries for fabricated steel work which have appeared include the following:

Stadium at Polo Grounds, New York, 1500 tons; bids closed June 20.

Telephone exchange at Coney Island, New York, 700 tons; bids closed June 19.

Third National Bank Building, Baltimore, 400 tons.

Bigelow-Hartford Carpet Co., Thompsonville, Conn., 300 tons.

City Club, Baltimore, 500 tons.

Erie Railroad shop at Hornell, N. Y., 900 tons.

City of New York, bridge material, 700 tons.

Bridges for Baltimore & Ohio Railroad, 400 tons.

State Capitol Building, Lincoln, Neb., 1970 tons, bids in.

Mt. Olive Lutheran Church, Milwaukee, bids asked.

Paper manufacturing plant, Kalamazoo, Mich., 500 tons.

Miramar Hotel, Rocky River, Cleveland suburb, 700 tons, bids taken.

Palmer Match Co., Kenmore, Ohio, 175 tons.

Factory building in Philadelphia, 700 tons.

Railroad Equipment Business

Over 5000 car and car body purchases came to light in the past week and contracts were closed for the repairs to 6000 cars.

The Wabash has awarded 750 box cars each to the Pullman Co. and to the American Car & Foundry Co., and has let 2050 gondola car bodies to General American Car Co. It has closed for 500 car underframes, amounting to 689 tons of steel, to the Decatur Bridge Co.

The Missouri, Kansas & Texas has awarded 200 refrigerator cars to the General American Car Co, while the General American Tank Car Corporation has taken orders for 30 tank cars from the Florida East Coast and 50 from the Mutual Oil Co. The New York Central has ordered 975 steel hopper car bodies from the American Car & Foundry Co. The Northern Pacific has placed an order for 250 ballast cars with the American Car & Foundry Co.

The New York, Chicago & St. Louis has placed repairs on 1000 box cars with the Illinois Car & Equipment Co., and the Erie has awarded repairs on 5000 box cars, distributed as follows: 1000 each to Standard Steel Car Co., Buffalo Steel Car Co., Youngstown Steel Car Co., and Illinois Car & Equipment Co., and 500 each to the Western Steel Car & Foundry Co., and the Illinois Car Co., Urbana, Ohio.

The Chicago, Milwaukee & St. Paul is negotiating for repairs on 300 all-steel hopper cars. The Philadelphia & Reading Railroad is inquiring for 1000 freight cars of 70-ton capacity. The Buffalo & Susquehanna Railroad has taken bids on 200 steel car bodies. The Norfolk & Western is inquiring for 1000 box and 1000 gondola cars and the Chicago & Eastern Illinois for six Pacific and ten Mikado type locomotives.

Temple Furnace to Be Started

Plans are on foot for starting up Temple furnace at Temple, Pa., and relining and repairs are now in progress. Note holders of the Seaboard Steel & Manganese Corporation, who bid in the furnace at the receivers' sale in 1921 through a committee of which E. G. Tillotson, Cleveland, was chairman, incorporated the Temple Furnace Co. with a view to reorganization, and the new company plans to start up the furnace in the next few months for the production of foundry iron. It is expected that the output will be sold by the Debevoise-Anderson Co., New York.

The Activity in Automobile Industry

According to the National Automobile Chamber of Commerce the May shipments of motor cars and trucks with a few companies still to be heard from, were in excess of 252,000 passenger cars and trucks, an increase of 53 per cent over May of last year and 15 per cent over April of this year. The heaviest previous production in the industry was 220,000 in the month of March, 1920. April exports of passenger cars gained more than 49 per cent over March, while the exports of trucks increased 44 per cent. These products went to 114 different countries.

The bi-monthly meeting of the steel works section of the Engineers Society of Western Pennsylvania was held in its rooms in the William Penn Hotel, Pittsburgh, Tuesday evening, June 20. K. Huessener, manager American Heat Economy Bureau, Pittsburgh, presented a paper with lantern slides on "Observations at German Iron and Steel Works with Special Reference to Heat Economy."

EXPORT TRADE IMPROVES

South America, Australia and South Africa Buy Small Lots—Japan Inquires for Heavy Rails

NEW YORK, June 20.—South American business continues to improve, but the majority of orders are small. Sheets, both black and galvanized, nails, wire and steel bars are called for in most of the inquiries being received, but severe competition from European sellers is resulting in a large portion of this business going to Belgian, German and British manufacturers. Both lower prices and the easier credit arrangements possible in dealing with Europe are believed to be responsible for this trend of South American buying. One export house in New York, a branch of a London company, reports having lost an order for 1500 tons of steel bars for Argentina, to its London office, which quoted a c. i. f. Buenos Aires price of $7 per ton under the American quotation, probably on European material. Besides the improved condition in South American countries, exporters report sales in small tonnages to Australia, New Zealand and South Africa, Australia being chiefly active in purchases of wire for fencing and South African buying covering a wide range of heavy hardware and other manufactured products. The higher domestic market prices now prevailing are evidently affecting export sales in a great many instances.

Last week 32 railroad cars left East Pittsburgh, containing electrical apparatus comprising the first shipment of material in the filling of the $7,000,000 contract for the electrification of the Chilean State Railways, awarded the Westinghouse Electric International Co. last October. Included in the shipment was an electric locomotive, one of the 39 to be furnished under the contract.

Japanese buying from merchant sources is beginning to improve and inquiry for wire, wire nails, black sheets and wire rods is said by American exporters to be fairly active. Government inquiries from Japan have slackened considerably during the past few weeks, the only reported tender now in the market calling for about 430 tons of bridge material, bidding on which closed this week. The South Manchuria Railway Co. is again in the market for 100-lb. rails, the tender calling for 40 miles (6280 tons) with accessories, delivered to Dairen, Manchuria. The previous tender of this railroad was placed with a German mill.

Germany Strong in Dutch East Indies

Although German competition in most markets is not now showing unusual strength, being in many instances outdone by Belgian quotations on iron and steel, reports from the Dutch East Indies by Consul Henry P. Starrett at Batavia, state that Germany's greatest advance in recovery of her trade in these colonies since the war has been in iron, steel, machinery and heavy hardware. It is pointed out that Germany has recently secured fair sized contracts for locomotives and freight cars from the Government railroads and German electrical installations are being made at waterworks and tramway systems.

The Third Netherlands Indies Commercial Fair, which will be held in Bandoeng, Java, September 18 to October 8, this year, is expected to be the largest of its kind ever held in the Netherland Indies, according to the Netherlands Chamber of Commerce, New York. Exhibits are solicited from manufacturers of machinery, agricultural implements, building materials with related articles and steamship and railroad companies.

Increased Canadian Buying of Welsh Tin Plate

British exports of tin plate to Canada during the first four months of 1922 have greatly exceeded the American exports. The total Canadian imports of British tin plate for this period were 18,399 tons while the American tin plate bought only totaled 6,929 tons. These figures may be compared to the Canadian imports of American tin plate in the first four months of 1913, which totaled 19,450 tons against imports of British tin plate of 2512 tons. In a statement of the condition of the Welsh tin plate industry an official of a prominent firm recently said: "By lowering costs in all directions British manufacturers have been able to get down to a strongly competitive basis. For the last six months the tin plate works of South Wales have been turning out from 60 to 70 per cent of their capacity. A most reassuring feature is that we are getting back the Canadian market which we had lost to the Americans previous to the war."

It is worthy of note that American sellers have offered tin plate delivered in Canada at $4 per base box, but were prevented from selling at this price, which is below the British price delivered, because of the Canadian anti-dumping laws, which forbid the sale of any material at less than 10 per cent below the price prevailing in the domestic market of the country of origin.

LABOR RELATIONS CAMPAIGN

Cleveland Chamber of Commerce Has Five-Year Plan to Gather and Publish Statistics

Plans for a five-year educational campaign in behalf of the open shop and better labor relations in Cleveland have been announced by the Cleveland Chamber of Commerce, which for some time has been conducting an aggressive fight against the closed union shop. To intensify the efforts, the committee on labor relations, of which Alexander C. Brown, president Brown Hoisting Machinery Co., is chairman, has been divided into three sub-committees. These are: Publicity, of which H. A. Rock, vice-president Van Dorn Iron Works, is chairman, and N. J. Clark, president Lake Erie Bolt & Nut Co., is a member. Research, of which H. C. Osborn, American Multigraph Co., is chairman. Edgar E. Adams, Cleveland Hardware Co., C. K. Brooks, National Malleable Castings Co., and Melvin Pattison, vice-president and general manager Brown Hoisting Machinery Co., are members. Legal, of which Stephen W. Tener, manager of the accident and pension departments of the American Steel & Wire Co., is chairman; and John G. Jennings, Lamson & Sessions Co., and Crispin Oglebay, Oglebay-Norton & Co., are members.

A campaign of publicity is to be conducted to secure the support of public opinion to the chamber's principles. The plan is to found the work upon scientific research under the directions of the sub-committee of that name. Special studies will be made and there will be a constant gathering of statistics. The research results will be published by means of public addresses, news articles, publicity campaigns in connection with labor disputes as they appear and by bulletin as developments arise in labor relations. The principle as advocated will be tested in the courts under the direction of the labor sub-committee, which will also look after prosecutions in case of violence in labor disputes.

Another Cut in Railroad Wages Announced

CHICAGO, June 17.—The United States Labor Board last night handed down a decision reducing the wages of clerks and station employees, stationary engine and boiler room workers, and signal department forces approximately $27,000,000 annually. The new wages to become effective July 1. The reductions range from two to six cents an hour and affect 320,000 employees.

Labor difficulties which caused a temporary suspension of the Girard plant of the A. M. Byers Co., Pittsburgh, have been adjusted. Rolling mill workers walked out following demand for a guaranteed wage instead of pay on a tonnage basis during period of low operations at the plant. The company's blast furnace at Girard has been idle because of inability to cover on its fuel requirements, and operation of its puddle and skelp mills was cut down in consequence. A rearrangement of working hours has been put into effect, under which employees agreed to return to work.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Plates

Sheared, tank quality, base, per lb.....1.60c. to 1.75c.

Structural Material

Beams, channels, etc.....1.60c. to 1.75c.

Iron and Steel Bars

Soft steel bars, base, per lb.....1.70c. to 1.75c.
Refined iron bars, base, per lb.....2.10c. to 2.20c.

Hot-Rolled Flats

Hoops, base, per lb.....2.40c. to 2.60c.
Bands, base, per lb.....2.40c. to 2.60c.
Strips, base, per lb.....2.40c. to 2.60c.

Cold-Finished Steels

Bars and shafting, base, per lb.....2.00c.
Strips, base, per lb.....4.00c.

Wire Products

Nails, base, per keg .....$2.40 to $2.50
Bright plain wire, base, per 100 lb..... 2.25
Annealed fence wire, base, per 100 lb..... 2.25
Galvanized wire, base, per 100 lb..... 2.75
Galvanized barbed, base, per 100 lb..... 3.05 to 3.15
Galvanized staples, base, per keg..... 3.05 to 3.15
Painted barbed wire, base, per 100 lb..... 2.55 to 2.65
Polished staples, base, per keg..... 2.55 to 2.65
Cement coated nails, base, per count keg..... 1.90 to 2.00
Woven fence, carloads.....70½ per cent off list

Bolts and Nuts

Machine bolts, small, rolled threads,
60, 10 and 10 per cent off list
Machine bolts, small, cut threads....60 and 10 per cent off list
Machine bolts, larger and longer.....60 and 10 per cent off list
Carriage bolts, ⅜ x 6 in.:
Smaller and shorter, rolled threads. 60 and 10 per cent off list
Cut threads .....60 per cent off list
Longer and larger sizes .....60 per cent off list
Lag bolts .....60, 10 and 10 per cent off list
Plow bolts, Nos. 1, 2 and 3 heads....50 and 10 per cent off list
Other style heads.....20 per cent extra
Machine bolts, c.p.c. and t. nuts, ⅜ x 4 in.:
Smaller and shorter .....50 and 10 per cent off list
Larger and longer sizes.....50 and 10 per cent off list
Hot pressed square or hex. blank nuts.....$4.50 off list
Hot pressed nuts, tapped .....$4.50 off list
C.p.c. and t. sq. or hex. nuts, blank.....$4.50 off list
C.p.c. and t. sq. or hex. nuts, tapped.....$4.50 off list
Semi-finished hex. nuts:
9/16 in. and smaller, U. S. S.....80 and10 per cent off list
Small sizes, S. A. E.....80 and 10 per cent off list
S. A. E. ⅝ in. and larger.....80 per cent off list
Stove bolts in packages.....80 and 5 per cent off list
Stove bolts in bulk.....80, 5 and 2½ per cent off list
Tire bolts .....65 per cent off list
Track bolts in carloads.....3.00c. to 3.25c. base
Track bolts, less than 200 kegs.....3.50c. to 3.75c. base

Upset Spare and Hex. Head Cap Screws

½ in. and under.....80 and 10 to 80, 10 and 10 per cent off list
9/16 in. to ¾ in.....80 and 10 to 80, 10 and 10 per cent off list

Upset Set Screws

½ in. and under.....80, 10 and 5 to 85 per cent off list
9/16 in. to ¾ in.....80, 10 and 5 to 85 per cent off list

Milled Square and Hex. Cap Screws

All sizes .....75 and 10 to 80 per cent off list

Milled Set Screws

All sizes .....70, 10 and 10 per cent off list

Rivets

Large structural and ship rivets, base per 100 lb.....$2.40
Large boiler rivets, base per 100 lb..... 2.50
Small rivets .....70 and 5 to 70 and 10 per cent off list

Track Equipment

Spikes, 9/16 in. and larger, base, per 100 lb....$2.25 to $2.35
Spikes, ½ in. and smaller, base, per 100 lb..... 2.50
Spikes, boat and barge, base, per 100 lb..... 2.50
Track bolts, base, per 100 lb..... 3.25
Tie plates, per 100 lb.....$1.75 to 2.00
Angle bars, base, per 100 lb..... 2.40

Welded Pipe

Butt Weld

Steel Inches	Black	Galv.	*Iron* Inches	Black	Galv.
⅛	54½	28	¼ to ⅜.....	+ 3½	+22½
¼ to ⅜.....	60	33½	½	36½	18½
½	65	50½	¾	42½	27½
¾	69	56½	1 to 1½.....	44½	29½
1 to 3.....	71	58½			

Lap Weld

2	64	51½	2	39½	25½
2½ to 6.....	68	55½	2½ to 6.....	42½	29½
7 to 8.....	65	51½	7 to 12.....	40½	27½
9 to 12.....	64	50½			

Butt Weld, extra strong, plain ends

¼	50½	33	¼ to ⅜.....+	4½	+37½
⅜ to ⅝.....	56	38½	½	35½	23½
½	62	50½	¾	42½	28½
¾	67	55½	1 to 1½.....	44½	30½
1 to 1½.....	69	57½			
2 to 3.....	70	58½			

Lap Weld, extra strong, plain ends

2	62	50½	2	40½	27½
2½ to 4.....	66	54½	2½ to 4.....	43½	31½
4½ to 6.....	65	53½	4½ to 6.....	42½	30½
7 to 8.....	61	47½	7 to 8.....	35½	23½
9 to 12.....	55	41½	9 to 12	30½	18½

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 and 2½ per cent.

Boiler Tubes

Lap Welded Steel		*Charcoal Iron*	
1¾ in.	26½	1½ in.	5
2 to 2¼ in.....	41	1¾ to 1⅞ in.....	15
2½ to 3 in.....	52	2 to 2¼ in.....	25
3¼ to 13 in.....	57	2½ to 3 in.....	30
		3¼ to 4½ in.....	32

To large buyers of steel tubes a supplementary discount of 5 per cent is allowed.

Standard Commercial Seamless Boiler Tubes

Discounts on cold-drawn or hot-rolled tubes in carload lots, f.o.b. Pittsburgh, follow:

1 in.	63	2½ and 2¾ in.....	46
1¼ and 1½ in.....	55	3 in.	50
1¾ in.	36	3½ to 4 in.....	55
2 and 2¼ in.....	42	4½ in. to 5 in.....	47

Less carloads, 4 points less. Add $8 per net ton for more than four gages heavier than standard. No extras for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be sold at mechanical tube list and discount. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Tin Plate

Standard cokes, per base box.....$4.75

Terne Plate

(Per package, 200-lb.)

8-lb. coating	$9.30	25-lb. coating I. C.....$14.25	
8-lb. coating I. C.....	9.60	30-lb. coating I. C.....	15.25
15-lb. coating I. C.....	11.80	35-lb. coating I. C.....	16.25
20-lb. coating I. C.....	13.00	40-lb. coating I. C.....	17.25

Sheets

Blue Annealed

Nos. 9 and 10 (base), per lb.....2.40c.

Box Annealed, One Pass Cold Rolled

No. 28 (base), per lb.....3.15c.

Galvanized

No. 28 (base), per lb.....4.15c.

Tin-Mill Black Plate

No. 28 (base), per lb.....3.15c.

Manufacturers have pamphlets, which can be had upon application, giving price differentials for gage and extras for length, width, shearing, etc.

Freight Rates

All rail freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic.	$0.36	Buffalo	$0.295	Kansas City	$0.815	Pacific Coast	$1.665
Philadelphia, export..	0.265	Cleveland	0.24	Kansas City (pipe)...	0.77	Pac. Coast, ship plates	1.335
Baltimore, domestic...	0.35	Detroit	0.325	St. Paul	0.665	Birmingham	0.765
Baltimore, export.....	0.255	Cincinnati	0.325	Omaha	0.815	Memphis	0.43
New York, domestic...	0.38	Indianapolis	0.345	Omaha (pipe)	0.77	Jacksonville, all rail..	0 555
New York, export.....	0.285	Chicago	0.38	Denver	1.35	Jacksonville, rail and water	0.46
Boston, domestic	0.405	St. Louis	0.475	Denver (wire products)	1.415	New Orleans	0.57
Boston, export	0.285						

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, $1; wire fencing, netting and stretcher, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 2½c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

MAHONING VALLEY CONDITIONS

Improved Fuel Situation and Strong Market for Sheets

YOUNGSTOWN, OHIO, June 20.—With partial resumption this week of the Empire plant at Niles of the Brier Hill Steel Co., consisting of eight units, active sheet mill capacity in the Mahoning Valley closely approaches normal. It represents the highest average production rate in the past two years.

This week the Republic Iron & Steel Co. started a merchant bar mill at the Brown-Bonnell works. Coke for the blast furnace at Warren of the Trumbull-Cliffs Furnace Co. will be furnished during the third quarter by the Youngstown Sheet & Tube Co., which has been supplying the stack with its fuel requirements. A reciprocal arrangement is in effect between the Sheet & Tube company and the Trumbull Steel Co., whereby the latter supplies a specified tonnage of coal for the Sheet & Tube by-product coke ovens.

Arrangements for coke supply for its Anna furnace at Struthers, a merchant stack, have been completed by the Struthers Furnace Co., New York, on a sliding scale basis. The stack has been prepared for relighting, to produce third quarter tonnage.

Valley furnace operators report a better demand for iron than prevailed two weeks ago. Last week 2000 tons of off-grade basic were disposed of for $24, Youngstown. Standard grades are holding firm at $25.

Improved Coal Operations

Important industrial coal consumers report betterment in the fuel situation. In the Connellsville region, car loadings were recently in excess of 25 per cent of normal, as compared with a low of 12 per cent, following the early stages of the strike. The Republic Iron & Steel Co. is operating one of its smaller properties, producing a small tonnage, while the Sheet & Tube and Brier Hill companies are preparing for resumption of activities at their Pennsylvania mines, in June.

Steel producers who have been buying in the open market report that prices are softer in the Connellsville and West Virginia fields. Run-of-mine, gas and coking coal is available readily at $3.25, while some of the larger buyers believe that lower prices could be obtained. In the Connellsville region, coal is purchasable at $3.75 to $4, which compares with a $2 price before the strike.

Firm demand for semi-finished steel and sold-up condition of Valley makers lends additional interest to the proposal broached to a number of non-integrated Valley sheet producers that they participate jointly with other concerns in the construction of an open-hearth plant. Prices on semi-finished above the $35 level now prevailing, for delivery beyond July, are more freely predicted. One Valley interest is willing to book tonnages for August and September delivery, but at prices to prevail at that time.

Demands for Sheets

Sheet prices continue to show fluctuation. A large producer in southern Ohio found buyers so willing to place commitments at the 3.30c. and 4.30c. levels for black and galvanized sheets, respectively, that it advanced its quotations $2 per ton. Pressure for all grades of sheets is particularly firm, but is felt especially in full finished grades. Buying interests catering to the automobile trade are offering premiums for delivery consideration, but are meeting with little response in this district.

Because of the growing requirements of the automobile industry, at least two Valley independents are considering the installation of full finished sheet capacity.

Representatives of sheet consumers are visiting the plants with more frequency to expedite deliveries and increase specifications, if possible. A factor in galvanized demand reflected in the sales of a large Valley maker is the Western wheat crop. This company's Kansas representative reports that harvesting has begun, that the crop is very good and will be considerably larger than originally estimated. In consequence warehouse interests are beginning to anticipate requirements of galvanized sheets for grain bins, wanted in Nos. 12, 14 and 16 gages.

INCREASING COAL PRODUCTION

Frick Company Adds to List of Active Ovens—Men Returning in Numbers

UNIONTOWN, PA., June 17.—With coal production showing a gain of some 10,000 tons during the past week, obliterating the decrease marked during Memorial week, observers believe that the increased production will be maintained and increased from week to week. The gain during the past week was brought about almost entirely by increased activity at plants of the H. C. Frick Coke Co., which added 350 to its active oven list at plants which have been affected by the miners' strike.

Hundreds of workers are coming into the region to take the places of the men on strike. Many of these are from union fields. Some attempts are being made on the part of the strikers to interfere with the arrival of what they term "scabs" and a small-sized riot developed for a few minutes at Brownsville one night last week. That was the most serious recent disturbance. There have been a number of dynamitings but without serious damage to property and with no casualties.

Forty-eight prisoners held in the Fayette county prison in connection with the rioting at Tower Hill No. 1 in which one State trooper was wounded, another badly beaten up and a striker shot, were released from the prison by the local courts this week on their own recognizance for appearance at the September term of court.

Old Employees Given Preference

Evictions in the region are being increased right along now as places are being made by the companies for workers who are coming into the region to replace men on strike. It is stated authoritatively that in every instance the old employees are given a chance to return to their work before eviction processes are executed. It is estimated that some 200 tents are dotted here and there over the county, providing shelter for evicted families. Numerous instances are reported of miners refusing to return to work where they were employed prior to the strike but taking up work in other plants in the region.

Coal quotations are fluctuating in the region from $3.50 to $4, with an occasional sale reported above $4.

Coal Mined in Illinois

The first coal mined in Illinois since the coal strike became effective April 1 was taken from the Loster & Sherwood strip mine, 6 miles east of Herrin, on June 16. Sixty miners were at work, guarded by two lines of men armed with machine guns. Armed sentries also patrolled the roads to the mines.

Steel Bridges for Siam

WASHINGTON, June 20.—Consul James P. Davis, of Bangkok, Siam, has transmitted to the Department of Commerce a form of tender and specifications to cover an inquiry for the supply of superstructures of steel railroad bridges for the Siam State Railways. These call for 35 spans of a total length of 1485 meters, comprising plate girder, plate girder deck, lattice girder through and special plate girder deck spans, all in accordance with the general sketch accompanying the specifications. Tenders must be in the office of the Siam State Railways in Bangkok not later than Oct. 1, 1922. American bridge-building firms are urged to participate in this tender. Detailed information may be obtained from C. P. Sandberg, 143 Liberty Street, New York.

NON-FERROUS METALS

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Straits Tin	Lead		Zinc	
June	Lake	Electrolytic*	New York	New York	St. Louis	New York	St. Louis
14.....	13.87½	13.62½	31.25	5.90	5.60	5.75	5.40
15.....	13.87½	13.62½	31.37½	5.85	5.60	5.75	5.40
16.....	13.75	13.50	31.37½	5.85	5.60	5.72½	5.37½
17.....	13.75	13.50	....	5.85	5.60	5.72½	5.37½
19.....	13.75	13.50	31.00	5.85	5.60	5.72½	5.37½
20.....	13.75	13.50	31.37½	5.85	5.60	5.72½	5.37½

*Refinery quotation.

New York

NEW YORK, June 20.

All the markets have turned quiet and prices have declined. A decided lull in demand pervades the copper market and only a moderate activity is recorded in tin. The lead market continues the strongest. Demand for zinc is light and quotations are slightly lower.

Copper.—The copper market is pursuing its traditional course and the heavy buying of recent weeks has given place to light demand even from foreign buyers. Producers are fairly well booked for some time to come, but the business that is available, while light, is being taken at concessions from recent prices, the minimum being 13.75c., delivered, or 13.50c., refinery, for electrolytic copper for June, July and August. Sizable inquiries for delivery throughout the year have appeared, but it is not clear whether definite contracts have been made for this extended position. The fact that consumers are willing to commit themselves for the last half of the year is taken to indicate the general stability of the copper market.

Tin.—The violent fluctuations in sterling exchange, particularly in the last few days, have been the controlling factor in the market for Straits tin and prices every day have varied almost from hour to hour. Moderate sales were made on June 14 and 15, but since then consumers have been inclined to await developments because of the uncertainty as to prices. Consumption of tin is large and undoubtedly consumers are drawing on stocks. To-day sterling exchange rebounded sharply, with the result that both consumers and dealers were quite active on the buying side. The principal items of interest are the arrival on June 17 of the Knight Templar, containing 2500 tons of Straits tin from the Far East, probably the largest cargo ever received here. The other item is the report of fair sales of Banca tin, ex-steamer Eurybates, due this week. Spot Straits tin was quoted here to-day at the close of the market at 31.37½, New York, and the London quotations were £152 7s. 6d. for spot standard, £153 7s. 6d. for future standard and £166 12s. 6d. for spot Straits, all about £3 per ton higher than a week ago, with moderate sales reported in London. Arrivals thus far this week have been 3915 tons, with 6480 tons reported afloat.

Lead.—Continued strength characterizes the lead market with only slight recessions in price, due to local conditions. Demand and consumption continue heavy. Books for July delivery have been opened and sales have been large, with the leading interest taking business for that position as well as for June at its established price of 5.75c., New York. Lead from independent producers is difficult to buy at less than 5.85c. to 5.90c., New York, while the St. Louis price ranges from 5.60c. to 5.62½c. We quote the market for early delivery at 5.60c., St. Louis, or 5.85c., New York and Eastern points.

Zinc.—Most producers of zinc are either out of the market or taking no business at less than 5.40c. to 5.45c., St. Louis, but the light demand that is prevalent is being satisfied by second hands at 5.37½c., St. Louis, or 5.72½c., New York. The statistical position of the market is particularly satisfactory, consumption being fully equal to or possibly in excess of production, with stocks brought down to within five weeks' supply.

Aluminum.—Demand continues good and virgin metal, 98 to 99 per cent pure, is quoted at 19c. to 19.10c., f.o.b. plant, by the leading producer, with the imported metal of the same grade available from foreign representatives at 17.75c. to 18.50c., New York, duty paid.

Antimony.—Wholesale lots for early delivery are quoted at 5.10c., New York, duty paid, with the market quiet.

Old Metals.—Business is very quiet and while values generally are firm, there are slight recessions among some holders. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible	13.50
Copper, heavy and wire	12.75
Copper, light and bottoms	11.00
Heavy machine composition	10.00
Brass, heavy	8.00
Brass, light	6.50
No. 1 red brass or composition turnings	8.75
No. 1 yellow rod brass turnings	7.50
Lead, heavy	4.875
Lead, tea	3.75
Zinc	3.00

Chicago

June 20.—Prices of all the metals have declined and demand is easy. It is felt that recent advances were overdone with the result that a reaction has set in. Old metal quotations are unchanged. We quote in carload lots: Lake copper, 14.50c.; tin, 32.50c.; lead, 5.65c.; spelter, 5.45c.; antimony, 7c., in less than carload lots. On old metals we quote: Copper wire, crucible shapes and copper clips, 10.75c.; copper bottoms, 8.75c.; red brass, 8.25c.; yellow brass, 6.75c.; lead pipe, 4.25c.; zinc, 2.75c.; pewter, No. 1, 20c.; tin foil, 22.50c.; block tin, 25c.; all buying prices for less than carload lots.

St. Louis

JUNE 20.—Lead was steady for the week at 5.60c. to 5.70c, car lots, while slab zinc was higher at 5.85c. to 5.95c., against 5.25c. the previous week. On old metals we quote: Light brass, 3.50c.; heavy red brass and light copper, 7c.; heavy yellow brass, 4c.; heavy copper and copper wire, 7.50c.; zinc, 2c.; pewter, 15c.; tin foil, 16c.; tea lead, 2c.; aluminum, 9c.

Rate of Heating in Hardening Steels

The rate of heating for hardening has rarely been accurately regulated though it is apparently of considerable importance at least in some steels and under certain conditions where control in dimensional changes in quenching is desired. This question is, therefore, of vital importance to manufacturers of die castings and in the production of thread gages. A series of 16 samples of chrome-vanadium die steel was hardened by the Bureau of Standards, using various rates of heating, and these dimensional changes noted. Unfortunately, the desired uniformity of results was not always obtained, but in view of the discrepancies found in other types of tests on the same steel, it is believed that the metal did not have the required uniformity. Similar tests of different steels will be carried out and upon their completion further comments concerning these changes will be made.

Study of Fluorspar Industry

R. B. Ladoo, mineral technologist of the Bureau of Mines, spent the month of April in the examination of fluorspar deposits of the Western States. On this trip fluorspar mines and mills were examined in New Mexico, Nevada and Colorado. Information obtainable on fluorspar deposits in Arizona, California and Utah indicated that deposits were not sufficiently important to warrant examination. None of the mines or mills visited was in operation, and it was evident that many of the deposits opened, particularly those of New Mexico, were war developments which cannot be considered of great importance under normal conditions. The information obtained on this trip will be used as the basis of a report on the mining of fluorspar in the Western States.

PERSONAL

Walter S. Goll has been appointed manager of the Fort Wayne, Ind., works of the General Electric Co. to succeed F. S. Hunting, recently resigned. Mr. Goll was graduated from Sibley College, Cornell University, as a mechanical engineer in 1896. In 1897, he became connected with the railroad engineering department of the General Electric Co. at Schenectady, and since that time has been connected with various subsidiary companies.

Stanley A. Dennis, associate editor of *Electrical Merchandising*, has resigned that position and his connection with the McGraw-Hill Co. to locate in Chicago and develop certain editorial and other work. He is now the editor of *Electrical Retailing*, published by the Rodger Publishing Co., Chicago. He has accepted editorial assignments from business papers in New York and Chicago and plans also to assist a number of manufacturers in making marketing surveys. To his work in this economic field Mr. Dennis brings an extended knowledge of merchandising problems.

H. M. Montgomery of the Pennsylvania Pump & Compressor Co., Easton, Pa., has been put in charge of a new district office located at 105 West Monroe Street, Chicago.

Henry J. Miller, Elizabeth, N. J., has recently been elected president of the Lake Torpedo Boat Co., submarine boat builder, Bridgeport, Conn., to succeed his late brother, Herbert S. Miller, who died recently. Mr. Miller is also a member of the directorate. He will remain in Elizabeth, but will maintain direct contact with the general offices of the company in Bridgeport.

J. G. Barry, sales manager of the General Electric Co. since 1917, and manager of its railroad department for many years, has been elected vice-president of the company. He has been connected with the General Electric and Thomson-Houston companies for 32 years. In 1894 he entered the railroad department and worked up to the position of assistant manager of this department in three years, becoming manager in 1907.

H. G. Austin, formerly with the Lackawanna Steel Co., Boston, has been appointed New England sales manager Central Iron & Steel Co., Harrisburg, Pa.

Frank H. Willard, assistant general manager, Graton & Knight Mfg. Co., Worcester, Mass., has been appointed by Governor Channing H. Cox to represent the Massachusetts State Chamber of Commerce on the advisory committee that is to consider the question of a consolidation of New England railroads.

George N. Landers, formerly vice-president Landers, Frary & Clark, New Britain, Conn., manufacturer of cutlery, is now associated with that corporation's New York branch.

Paul B. Morgan and Jerome R. George, Morgan Construction Co., Worcester, Mass, maker of rolling mills, arrived home last week from a business trip abroad.

William H. Eager, vice-president Whitman & Barnes Mfg. Co., Akron, Ohio, has become president of that company, succeeding A. D. Armitage, who resigned. Mr. Armitage will devote his entire time to the business of the J. H. Williams Co., Brooklyn, N. Y.

Robert E. Belknap, district sales manager at Chicago for the Bethlehem Steel Co., sailed on the Melita for Europe on June 21. He is accompanied by Mrs. Belknap, and will visit France, England and possibly Germany and Italy.

H. Collier Smith, president Quickwork Co., St. Marys, Ohio, sailed June 20 for an extended visit to Europe.

Walter J. Evans has been appointed manager of the Philadelphia sales office of the Webster Mfg. Co., with headquarters at 719 Commercial Trust Building.

Charles F. Rand was elected president and C. Minot Weld vice-president of Moa Bay Iron Co. at its annual meeting in New York, June 7. The company has 250,000,000 tons of iron ore on the north coast of Cuba.

OBITUARY

CHARLES F. ANGELL, president and treasurer Providence Steel & Iron Co., Providence, R. I., steel fabricator, died June 14 after a brief illness following an operation. He was born at Scituate, R. I., Oct. 21, 1856, received his education at the old Lapham Institute of that town, and then went to Providence, where he entered the employ of the Builders' Iron Foundry. He remained with that firm until 1905, when he organized the Providence Steel & Iron Co.

ALBERT HANSON NELSON, Brighton, Boston, long identified with manufacturing interests, died June 14 at his home, in his forty-third year. At the time of his death Mr. Nelson was associated with the Nelson Mfg. Co., Taunton, Mass., and was formulating plans for the production of a tractor on a large scale. Formerly he was president of the Nelson Blower & Furnace Co., South Boston, a firm now out of existence.

LUTHER R. PLUMMER, one of the owners of the Willie Co. of Pennsylvania, maker of laundry machinery, died at the Trumbull Hospital, Boston, June 13, aged 57. He was sales representative of the firm and made his home at Brattleboro, Vt.

NELSON PRICE WHITAKER, former steel manufacturer and until recently a member of the State road commission, died June 17, at Wheeling, W. Va., at the age of 49. He went to Wheeling when a young man and after completing his education at Cornell University, became associated with the Whitaker-Glessner Co. Mr. Whitaker was elected to the West Virginia House of Delegates in 1916 and was selected by Governor Morgan to represent the northern part of the State on the State road commission. He resigned recently on account of failing health.

JAMES WATSON PRENTER, Philadelphia manager of sales, the Pittsburgh Screw & Bolt Co., Pittsburgh, died suddenly of heart trouble June 13, at the age of 42. He was born in Pittsburgh and for many years represented the company in Philadelphia. At the time of his death he was in Pittsburgh attending a meeting of the company's sales managers.

ALBERT L. ANDREWS, one of the founders of the Andrews Steel Co., and the Newport Rolling Mill Co., Newport, Ky., died suddenly at his home in that city, June 19. He was born in Cincinnati in 1842 and retired from active business life four years ago at the age of 76. He is survived by three sons, Albert K., Joseph Gaff and Frank N., all actively associated with the management of the Newport company.

Armature Baking on Shipboard

An industrial oven to go afloat—an electrically heated armature baking oven—soon will be installed in the U. S. submarine mother ship Medusa. The oven was accepted for the Navy Department by inspectors on June 6 who put it through the prescribed 24-hr. test at the plant of its designer and builder, the Gehnrich Indirect Heat Oven Co., Inc., Long Island City, N. Y. When an armature needs rewinding and thus must be baked, the whole job can now be done at sea.

The oven is the standard Gehnrich oven, electric heating type, measuring, over all, 9 ft. 2 in. wide by 6 ft. 2 in. deep by 6 ft. 6 in. high. The side walls and top are insulated with magnesia block 4 in. in thickness. The body sections are built and assembled with the Gehnrich patent binding strip which eliminates the use of through bolts. The heating elements are General Electric Co. low gradient nichrome alloy, air heaters and the connected load is 32 kw.

It is stated that German smelting concerns are negotiating with the Ukrainian Government for a concession to work the manganese mines of Kalaseff, and that an English group has made a counter proposition.

TO MAKE IRON IN BRAZIL

Electrical Shaft Furnaces for Ore Reduction and Converters for Making Steel

WASHINGTON, June 13.—Supplementing a previous report made to the Department of Commerce regarding the Brazilian iron and steel industry, American Commercial Attache W. L. Schurz, Rio de Janeiro, has sent under date of May 6, interesting data obtained from the American Chamber of Commerce at Sao Paulo based on a memorandum prepared by the engineer in charge of the installations of the Companhia Electro-Metallurgica Brazileira of Ribeirao Preto. The text of the report is in part as follows:

The Companhia Electro Metallurgica Brazileira is the result of several years of study on the part of the administration of Empreza Forca e Luz de Ribeirao Preto. The latter company, which has an extensive network of power lines supplying about 9000 hp. of agricultural load during the dry season, has a relatively small load during the months the stream flow is the greatest. The cities and towns the company supplies with light, power, water and sewers are also almost entirely dependent on surrounding farms. The agricultural customers are as a rule steady and reliable customers, but prices of products vary widely. Occasional frosts occur, such as the great frost of 1918, after which 1400 hp. of load was disconnected, so that it was deemed advisable to develop some other source of income.

Various electrochemical industries were studied, and owing to market conditions, supplies of ore and other raw material, it was decided to smelt iron ore, of which an abundance of highest grade was found in the vicinity.

The Empreza purchased the ore deposits, sent their manager abroad with samples of ore, charcoal, and limestone to make a careful study of the business, and on his return the Cia. Electro-Metallurgica Brazileira was formed. Forty per cent of the stock of this company belongs to the Empreza Forca e Luz, and the remainder to about 90 individuals, farmers, merchants and capitalists of Ribeirao Preto and Sao Paulo.

After various negotiations regarding the erection of the plant in May, 1920, the Metallurgica signed a contract with Corning & Co., Albany, N. Y., for the building, furnaces and all machinery with the exception of the electrical equipment.

In August of the same year, the Metallurgica ordered the necessary electrical equipment from the General Electric Co., and the following May broke ground for the plant.

A brief description of the plant may be of interest. The pig iron furnace building is a three-story structure, about 25 meters high. The ore, limestone and charcoal, after being mixed in proper proportions, are charged in the furnaces on the third floor. The furnaces are two in number, of the Electrometall shaft type, commonly used in Sweden, each one supplied by a transformer bank of 4650 kva. capacity, and capable of a normal output of 30 tons of pig iron per day. The furnaces are continuous in operation, having an annual load factor of 80 per cent. The Metallurgica has purchased the exclusive rights to construct and operate in Brazil this type of furnace, for a period of 10 years. The furnaces were built in the United States from the Swedish drawings. The liquid pig iron will be handled by one of two cranes serving the main building, and poured into one of the two six-ton Bessemer converters, to be blown to mild steel. The blowing engine is driven by a 675-hp. synchronous motor.

The steel will then be poured into the ingot molds or poured into a 6-ton electric steel furnace for further refining, which furnace will also melt down scrap iron, of which a considerable stock is already on hand.

The reheating furnaces for the ingots are to be fired by the iron furnace gas, and have auxiliary oil burners. The roll trains are driven by two 500-hp. induction motors through reduction gears. The plan is to roll the simplest and easiest sections for which there is the greatest demand in that part of the country. The converters, electric steel furnace, reheating furnace, rolling mills and machine shop are in one building, 23 x 128 meters. The electrical substation building, containing the switchboard, blowing engine, water pumps, storage battery, etc., is located on the side opposite the iron furnace building. The high tension electrical equipment, consisting of two 500-kva. 60,000/-6000 volt transformers, with necessary switching and protective apparatus, is located out-of-doors and connections to the distributing board are made underground. Other buildings, such as offices, warehouses, charcoal storage house, etc., are under construction.

For a charcoal supply the Companhia Metallurgica has purchased 2000 alqueires (5977 acres) of woods near Bertaozinho, and has erected 100 beehive ovens, the intention being in the near future to plant eucalyptus at a convenient site, and install a by-product plant.

The ore and limestone will come from the company's property near Sao Sebastiao de Paraiso, and will be transported by the Sao Paulo-Minao Railroad, on which the company has taken an option. Water for the plant will be obtained from the 16-in. aqueduct from the Rio Pardo. Power will be supplied by three generating stations of the Empreza Forca e Luz de Ribierao Preto (Light & Power Co. of Ribeirao Preto) which installed all electrical equipment. Corning & Co. sent out a staff of engineers to erect the plant and supervise the operations during the first few months.

It is hoped that the plant will furnish the raw materials for many new industries to be located in the Empreza's zone of operation and thus fulfill the expectations of its founders.

The foregoing is outlined in trade information bulletin No. 6, iron and steel division, Department of Commerce, from which the bulletin may be obtained.

German Steel Exports in March

Exports of steel from Germany in March were 211,-979 metric tons, with 172,709 tons exported in February and 221,743 tons in January, according to *Stahl und Eisen*. Imports for March were 125,158 tons, with February and January at 81,878 and 100,907 tons, respectively. The following table gives the details of the German foreign trade for March and the three months in metric tons:

	Imports, 1922, First Quarter	Exports, 1922, First Quarter	Exports, March, 1922
Pig iron	26,215		
Ferroalloys	3,475	61,698	24,830
Scrap	63,481		
Cast iron pipe	11,495	8,345	2,992
Rolls	91	4,920	2,076
Machine parts	380	2,021	722
Other castings	2,380	18,805	5,854
Blooms, billets, sheet bars	33,104	9,840	3,173
Bars, joists, strips	107,615	139,266	42,877
Plates and sheets	10,179	58,349	17,687
Tinplates and other sheets	1,319	7,686	2,937
Wire (rolled and drawn)	8,520	35,122	11,267
Tubes	2,923	30,726	10,239
Rails, sleepers, fishplates	15,981	77,182	30,046
Wheels, axles, tires	23	11,692	3,786
Forgings, etc.	2,112	31,028	11,843
Structural work	132	13,727	5,462
Boilers, etc.	837	5,668	2,673
Anchors, hammers, etc.	59	1,560	522
Agricultural implements	145	9,235	3,406
Tools	463	9,690	3,435
Rail joint studs	1,526	.....	.....
Other railway materials	90	.....	.....
Bolts, nuts, rivets	1,788	8,491	3,119
Carriage and cart axles	71	694	258
Railway and cart springs	115	325	110
Wire ropes	38	14,278	5,969
Other wire goods	122	2,036	736
Wire and other nails	90	13,083	4,985
House utensils	33	10,069	3,879
Chains	25	1,776	582
Miscellaneous	13,118	19,120	6,515
Total iron and steel included above	307,943	606,431	211,979
Machinery	3,147	112,199	40,247

For the last eight months of 1921, May to December, the only data published, the German steel exports averaged 203,681 tons per month. In 1920 the steel exports were 145,883 tons per month with the imports at 34,950 tons per month.

British Iron and Steel Market

More Furnaces in Blast—Local Prices Stiffer But Continental Prices Weaker—Railroad Buying Better—May Exports 272,437 Tons

(By Cable)

LONDON, ENGLAND, June 20.

Both home and export demand for pig iron is improving slowly. No. 1 Cleveland and No. 3 G. M. B. are scarce. One additional furnace has been blown in on foundry iron, and one on basic iron. Preparations are being made to relight others. Prices are firm.

Hematite producers have restarted one furnace, owing to signs of a revival in demand.

Managers of steel works generally are not pleased at recent home trade reductions, owing to continuing high cost of production, and some makers are not booking orders.

Home railroads are buying more freely. The Caledonian has placed orders for 20 locomotives and 500 trucks. Foreign railroads also are showing more interest. Victoria has bought 5000 tons of rails, the Bengal-Nagpur Railroad, 8500 tons and Siam, 10,000 tons. Russia is reported placing orders in Sweden for 1000 locomotives. India is buying small parcels of plates, bolts and nuts.

There is improved demand for Continental steel. Merchant bars and plates have been sold to Bombay, Calcutta and China. Bombay is inquiring for joists (steel beams). Hongkong has bought merchant bars and plates. Mixed specifications of Belgian merchant bars are being quoted at £7 15s. (1.53c. per lb.) f.o.b., for July delivery.

Tin plate is steady and a fair business is going on with all parts of the Continent, including Scandinavia and the Near East. The Far East is quiet. Home traders are buying over their July requirements. Odd sizes are quoted at 19½s. ($4.31) f.o.t. Wasters are steady, buyers offering 17½s. ($3.87) basis, f.o.b.

Demand for galvanized sheets is increasing, though tonnages sold are as yet unimportant. Sales have been made to South America, Roumania, China and India. Singapore and the Straits are inquiring. Japan is buying black sheets for galvanizing. Small sales have been made to Roumania and to South America.

Iron and steel exports for May amounted to 272,437 gross tons.

We quote per gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at $4.42 per £1, as follows:

Durham coke, delivered	£1	7s.	to	£1	7½s.	$5.97	to	$6.08
Cleveland No. 1 foundry	4	15				21.00		
Cleveland No. 3 foundry	4	10				19.89		
Cleveland No. 4 foundry	4	7½				19.34		
Cleveland No. 4 forge	4	2½	to	4	5	18.23	to	18.79
Cleveland basic	4	10				19.89		
East Coast mixed	4	15	to	4	16	21.00	to	21.22
Ferromanganese	15	0				66.30		
Ferromanganese*	14	10	to	14	15	64.09	to	65.20
Rails, 60 lb. and up	7	17½	to	9	10	34.81	to	41.99
Billets	7	0	to	8	0	30.94	to	35.36
Sheet and tin plate bars, Welsh	7	7½				32.60		
Tin plates, base box	0	19½	to	0	19¾	4.31	to	4.37
						C. per Lb.		
Ship plates	9	5	to	10	0	1.83	to	1.97
Boiler plates	13	10	to	14	0	2.66	to	2.76
Tees	9	10	to	10	10	1.88	to	2.07
Channels	8	15	to	9	15	1.73	to	1.93
Beams	8	10	to	10	0	1.68	to	1.97
Round bars, ¾ to 3 in.	9	10	to	10	0	1.88	to	1.97
Galvanized sheets, 24 g.	15	12½	to	15	15	3.08	to	3.11
Black sheets	12	0				2.37		
Steel hoops	12	0	&	12	5*	2.37	&	2.42*
Cold rolled steel strip, 20 g.	23	2½				4.56		
Cotton ties, Indian specifications	15	0				2.96		

*Export price.

Continental Prices, All F.O.B. Channel Ports, Delivery as Specified

No. 3 foundry pig iron:								
Belgium, June	£4	12½s.	to	£4	15s.	$20.44	to	$21.00
Luxemburg, June	4	12½	to	4	15	20.44	to	21.00
France, June	4	12½	to	4	15	20.44	to	21.00
Basic pig iron:								
Luxemburg, June	4	6	to	4	7	19.01	to	19.23
Billets:								
Luxemburg, June	6	5				27.63		
Lorraine, June	6	5				27.63		
Wire nails (keg basis):								
Germany, August	0	14½				3.10		
Wire rods, 5 mm. (0.2 in.):								
Belgium, June, July	7	5				32.05		
Angles:						C. per Lb.		
Belgium, June, July	7	10	to	7	12½	1.48	to	1.51
Tees:								
Belgium, June, July	8	5				1.63		
Channels:								
Belgium, June, July	7	10	to	7	12½	1.48	to	1.51
Merchant bars:								
Belgium, July	7	13½	to	8	0	1.52	to	1.59
Luxemb'g, July, Aug.	8	0				1.59		
Germany, July, Aug.	8	0	to	8	7½	1.59	to	1.61
France, July	8	5	to	8	10	1.63	to	1.68
Joists (beams):								
France, July, Aug.	7	7½	to	8	0	1.46	to	1.59
Belgium, July, Aug.	7	7½	to	7	10	1.46	to	1.48
Luxemb'g, June, July	7	15	to	8	0	1.53	to	1.59
Belgium, June, July	8	2½				1.61		
⅛-in. plates:								
Germany, July, Aug.	9	5				1.83		
Belgium, July	8	0	to	8	2½	1.59	to	1.61
Luxemburg	8	10				1.68		
¼-in. plates:								
Germany	9	0				1.78		
No. 8 gage wire:								
Belgium, July, Aug.	14	10				2.86		
Plates:								
Luxemburg, spot	8	10				1.68		

Great Northern Ore Properties in 1921

The fifteenth annual report of the trustees of the Great Northern Iron Ore Properties, covering the year ending Dec. 31, 1921, shows total receipts of $6,088,063.24 from the various proprietary companies. From the Arthur Iron Mining Co. the receipts were $3,369,000, from the Tyler Iron Mining Co. $961,000, from the Polk Iron Mining Co. $544,000, from the Harrison Iron Mining Co. $443,000. The remainder came from six other mining companies. There were two distributions of $2 per share in the year, or a total of $6,000,000. The total of iron ore shipments in 1921 was 2,768,641 tons, of which 1,863,977 tons come from Mesabi range mines covered by "new leases," or leases made since Jan. 1, 1913, and 841,667 tons from mines operated under "old leases." The latter include the Great Northern interest in Mahoning, Utica, Leetonia, Stevenson, West Stevenson, North Stevenson and Sweeney mines.

The total receipts of the trustees of the Great Northern Ore Properties from Dec. 7, 1906, to Dec. 31, 1921, were $40,015,267.86 and the total disbursements $39,817,794.01, leaving undistributed receipts of $197,473.85.

Fleet Corporation Disposing of Diesel Engines

WASHINGTON, June 20.—The material sales division of the Emergency Fleet Corporation last week sold two McIntosh & Seymour 900-hp. Diesel engines to the Munson Steamship Lines and also has sold 3000 tons of plain ship steel at Alameda, Cal., to the Hyman-Michaels Co. The fleet corporation has for sale the following Diesel engines: two Bolinder 320-hp.; five McIntosh & Seymour 750-hp; 10 Scandia Pacific Oil Engine Co. 825-hp.; two McIntosh & Seymour 900-hp. These engines are located at Alameda, Hog Island, Pa., and South Norwalk, Conn.

Wage Trend Turns

In its seventh monthly survey of wage changes up to June 15 in various industries in the United States, the National Industrial Conference Board, 10 East Thirty-ninth Street, New York, notes a growth in the number of wage increases reported, as compared with the previous month. The Board's statement says: "There has been in the past month a decided decrease in the number of wage changes in general, with a rapidly approaching balance between reductions and increases. This month tips the scales in favor of the increases. In April there were 54 reductions and 9 increases reported; in May, 21 reductions and 26 increases.

Foundrymen's Meeting at Rochester

(*Continued from page* 1744)

by the use of a flux consisting of a metallic chloride such as zinc or sodium chloride. These fluxes are commonly used, but fail to accomplish the desired results because of not being used properly. After the dross is removed the flux should be introduced by immersing it to the bottom of the bath and should be held there until ebullition ceases. This is best accomplished by placing the flux on the surface and immersing it with a rod with a spiral coil at the lower end permitting gases to escape up through the bath. The flux tends to free the oxide and a layer of this will appear on the surface, which should be removed.

Owing to the low specific gravity of aluminum, the drosses formed during pouring have a tendency to escape through the metal and the castings are liable to be spongy. To prevent this the molds should be made in green sand lightly rammed. By the use of vents and the proper location of gates and risers, the air can be driven out and a sound casting produced.

Mr. Weil said that it is a common practice to use chills to prevent shrinkage cracks, but he declared this is not desirable as the chills cool the metal too rapidly in spots, producing hard spots. He laid stress upon the necessity of proper location of gates and risers. He said eddy currents can usually be prevented by changing the location of gates and regulating the speed of pouring. With proper practice castings made of secondary aluminum will have a close grain and good machining qualities. The drag noticed in molding virgin aluminum castings is eliminated, and as a result can be machined more rapidly and present a smoother finish.

William Krodel said that he introduced zinc chloride as a flux, but this exploded when it touched the metal. Now he introduces it with a rod and the explosion occurs at the bottom. Mr. Weil, in the discussion, said cracks are due to shrinkage and shrinkage can be compensated for by the proper feeding of the metal into the thick sections of the molds through gates and risers. One application of flux is sufficient if it is properly introduced so that it will reach all the metal. Some foundries use secondary metal exclusively for certain automobile castings, but not many castings can be made exclusively of this metal. The metal recovered from drosses can be made as good as any other aluminum.

"The Effect of Impurities on the Oxidation and Swelling of Zinc-Aluminum Alloys" was the subject of a paper by H. E. Brauer and W. M. Pierce, New Jersey Zinc Co. The authors stated that among the zinc, base alloys used for castings in metal molds, particularly die castings, those alloys containing aluminum, usually together with copper, are probably the most widely used because of their desirable mechanical properties and the fluidity and absence of hot shortness which facilitate casting. Objections may be raised on the use of these alloys because of failure, due to disintegration or intercrystalline corrosion. In all cases which had come to their attention when conditions of service were known, failure of zinc-aluminum alloys is due to the combined effect of heat and moisture. Certain metals, when present even in hundredths of one per cent, were found to accelerate the oxidation noticeably. Lead was found to be the most powerful accelerator and cadmium and tin nearly as effective, iron being somewhat less active. Nickel and manganese alone in zinc-aluminum alloys were materially detrimental. Copper to the extent of 0.5 per cent was found to be a powerful retarding agent, and in any amount up to 5 per cent more or less beneficial. In dense castings of fine grained alloys free from detrimental impurities, the rate of penetration is very small and uniform, and results in a slight expansion without distortion.

The paper was discussed by Prof. C. H. Matthewson, New Haven, Conn., and others. C. H. Bierbaum, Lumen Bearings Co., Buffalo, said that the greatest detriment he had found to a zinc-copper-aluminum alloy was the presence of tin, although other impurities were a factor.

Other Non-Ferrous Sessions

Besides the foregoing important session on the aluminum industry, there were three other meetings devoted to non-ferrous topics. An adequate report of these meetings is impossible at this time. At one of the meetings on brass foundry topics, Tuesday afternoon, June 6, W. M. Corse, secretary, Institute of Metals Division of the mining engineers, presented a most interesting moving picture on the mining and refining of nickel as carried on largely in Canada by the International Nickel Co. A paper on "Brass Forgings" by C. G. Heiby, Mueller Metals Co., Port Huron, Mich., covered much of the ground embraced in a paper on the same subject published in THE IRON AGE, March 20, 1922. A lively discussion, which presented some novel features, followed the reading of a paper written by R. E. Lee and F. B. Trace, Allegheny College, Meadville, Pa., on "An Investigation of Segregation With a View to Preventing Its Occurrence in Castings Made of High Lead Bronze." Professor Lee presented the paper.

Another important session on brass foundry subjects, which W. B. Price presided over, was devoted largely to melting problems, particularly gas absorption and oxidation, covered by several important papers.

Technical Session on Molding Sand Research

THE molding sand research session, which began Thursday morning, with R. A. Bull as chairman, was easily one of the most interesting of the convention. It was also featured by an exceptionally large attendance. At one time no less than 375 were present. The time allotted for the session was insufficient for the presentation and discussion of the several papers and a measure of the interest in the subject was provided by a unanimous vote to continue the meeting on Friday morning. Because there was a meeting of the joint committee of the American Foundrymen's Association and the National Research Council on molding sand research during the boat ride, Thursday afternoon and evening, the subject may be said to have been under consideration for a day and a half. The joint committee boat meeting was productive of the development of future plans of the body.

After a brief review by Chairman Bull of the activities of the joint committee at Thursday morning's session, there were brief addresses by Dr. H. Ries, department of geology, Cornell University, chairman subcommittee on geological survey; F. L. Wolfe, Ohio Brass Co., chairman of the subcommittee on reclamation, and H. B. Hanley, chairman subcommittee on test standards.

Test Standards for Sand

Mr. Hanley said that in the shaping of its plans his committee had started out with the best known of existing tests and, while the scope of the committee's work entailed a set of standardized tests for fineness, bond, permeability, water content, thermal qualities and the rational, chemical and minerological analyses, no definite result yet had been achieved beyond preliminary steps on fineness and bond standards. In connection with the standardization of fineness tests, he said it was proposed to use sieves of Nos. 6, 12, 20, 40, 70, 100, 140, 200 and 270, the work to conform to the standards of the Bureau of Standards. Nested, he said, the sieves would afford an accurate means of gaging the grain of sand and charting was readily possible. Mr. Hanley said it was the hope of the committee to be able by next fall to present printed reports of the several standards to be proposed.

Dr. Reis said he had been in touch with the geologi-

cal departments of most of the states, with gratifying results in the matter of obtaining the cooperation of these state organizations. Mr. Wolfe, only having recently been made chairman of the reclamation subcommittee, was able to say only what the committee hoped to do and suggested that the name of the committee should be changed to the subcommittee on consumption and reclamation.

There were a number of sand producers present and the ensuing discussion ran heavily to the commercial phases. Some foundrymen complained of the irregular quality of the sand they received. This brought the suggestion from producers that the sand was poor because users generally bought on price and that if sand of quality was desired the price should be high enough to cover the higher cost. Both producers and consumers voiced approval of the effort to establish standards. It was plain that all sensed the importance of more knowledge as to sands and that iron, no longer being analyzed by fracture, it was time to abandon the guesswork as to the analysis of sand.

Testing Green Bonded Strength

R. J. Doty, Sivyer Steel Casting Co., Milwaukee, in his paper "Establishing a Method of Testing for Green Bonded Strength" detailed the exhaustive tests made in trying to establish a reliable standard method. The transverse test was first used and then the tensile test. Attempts to conduct tensile tests on a horizontal plane were hampered by many uncertain factors, such as sliding friction and the interference of sand with working parts. Finally vertical tests were tried. After frequent changes in the size and shape of the core box, fairly consistent results were obtained but the question of uniform packing of the core in the box remained unsolved. This led to a study of the effect of mixtures of sand and clay and the change in weight and volume.

Having finally settled upon a design of core box and found a method of uniform filling, the results were so surprisingly favorable as to lead to the belief that a standard method of testing had been established, which would be reliable and of value, for comparative purposes, at least.

Another presented by Mr. Doty: "A Study of the Change in Grain Size of Silica Sand Through Constant Addition of Clay," was an amplification of the discoveries made in connection with experiments in establishing a satisfactory method of testing green bond strength.

Screen Tests of Molding Sand

H. A. Schwartz, National Malleable Castings Co., Cleveland, presented a paper on "The Significance of the Screen Test of Molding Sands" in which he asserted that the sieve test of molding sands has little value in the study of the commercial properties of sand. He showed that the relation between grain size and perviousness is too hopelessly complicated to be studied by means of the sieve test. The problem of determining the resistance of sand, to the passage of air or its perviousness, he said, was capable of simple and direct observation by determining the rate of flow of air through the sand at some selected pressure. The data may be expressed either in volume of air per unit of time or in time per unit volume. The two are reciprocally related and the latter form is the more direct measure of the property of interest in the foundry than the former.

The form of test, which Mr. Schwartz disclaimed originating, consisted of running into a tube three successive measured lots of sand, each filling the tube one inch deep before ramming. Each layer was settled in place by three blows of a weight of ¼ lb. falling 1 in. The time was observed for 250 cubic centimeters of water to flow out of an aspirator bottle under a constant fixed arbitrary head of 3½ in. The apparatus was used primarily for direct measurement of the resistance to flow of natural or used molding sands. For purposes of experiment, a given sand was separated into fractions by screening through 20, 40, 60, 80 and 100 mesh sieves. The various fractions were then combined in various definite properties, two at a time, and the resistance to flow of air of the binary mixtures determined.

Attention is here called to a paper by S. H. Cleland, National Engineering Co., Chicago, entitled, "The Preparation of Steel Foundry Sands," which could appropriately have been scheduled for this session. It was presented by the author at a steel session and reported upon in THE IRON AGE June 15.

The Session on Industrial Relations

The program for the session on industrial relations comprised five papers and one committee report. The chairman of the session was Dean C. B. Connelley, Department of Labor and Industry, State of Pennsylvania, Harrisburg, Pa. The meeting, though not largely attended, was an enthusiastic one. A feature was the paper on the prevention of intensity in depressions in business cycles.

Amelioration of Business Depressions

"Human beings of every rank and walk in life are both the causes and the victims of business depressions," said E. F. DeBrul, general manager National Machine Tool Builders' Association, Cincinnati, in his address on the "Cycles of Depression and Their Prevention," given at the industrial relations session. "Neither cure nor prevention can be expected," he said, "until the mass recognizes the causes and co-operate in the prevention." In this connection it was pointed out that the average business man doesn't seem to care enough about the subject to get down to hard study and keep his own house in order; "most business men seeming to prefer to let things drift and than blame anyone or anything but themselves for the losses they suffer." Financial disease was pointed out as being personal to the individual companies, and those individually unhealthy were cited as a drain on the community for the reason that the healthy are deprived of a market that would otherwise be offered. He advocated a broader viewpoint generally, saying in this connection that "too many regard business as a species of warfare and have not yet received the broader vision that all business is co-operative and constructive, not combative and destructive."

Management Responsible for Depressions

"The fundamental cause of depressions," Mr. DeBrul said, "is that too many of us business executives are ignorant of certain very important phases of our jobs as managers." He emphasized that the element most responsible was the one which holds the final authority, the entrepreneur element, as represented by the management; the element, in short, that dictates the policy of a business. "Depressions," he said, "are ultimately due to maladjustments between supply and demand. The maladjustments occur because those responsible for supply know too little about either supply or demand to make the adjustment when needed."

Commercial Paper Predicts Iron Price Trend

"How many foundrymen," he asked, "have really studied the course of the pig iron market for which they have had charts and statistics for years? How many know that for years the discount rate of four to six months' commercial paper has predicted, with uncanny accuracy, the course of pig iron prices and production, about five months in advance? How many blast furnace men knew this, and if they did, how many tried to spread their knowledge to others so that it would save the iron business from the losses of depression?

"How many foundrymen have known that a statistical service could be organized among them which would indicate far in advance when the blast furnace could start, in anticipation of actual melting of iron for castings? If this were done there would be less shortage of iron and less consequent skyrocketing of

prices at the peak of demand. A complete compilation of new orders, cancellations and suspensions, production and shipments, stocks on hand and unfilled orders by grades, would give the foundry iron producers a wonderful picture of the state of supply and demand," he stated. Those figures, he pointed out as helping producers themselves, if they were published where all buyers could use them, and stated that in such cases public comment on the significance of different phases would result. Buyers and sellers alike would be able to run their businesses more intelligently and the furnaces would consequently have more regular operation than now.

"When will the furnacemen all realize," Mr. De Brul asked, "that it is against their interest to overload buyers with high-priced pig iron? And when will all foundrymen get sense enough to stay out of a runaway market and not heed the iron salesman's talk as to why prices can never come down again?" Answering the question, he said, "I guess it will be when the foundrymen learn that it is dangerous to speculate in iron."

Study of Cycles Pays

"Every industry can have effective means of estimating supply and demand," said Mr. DeBrul, which, he continued, "can be gaged only by co-operative study, statistical compilation and interpretation of the various cyclical movements as they develop in each industry. This takes enlightened selfishness to appreciate and accomplish. Few managers realize that a study of cyclical movements in independent industries repays the time and money spent on it. It is just because they are not enlightened," he stated, "that they refuse to give the slight co-operative effort needed to collect the information and learn its significance to them in their own business." Without this information they can only proceed in ignorance of facts, he pointed out, and as a consequence have the losses caused by overstocking with high-priced material or product in the face of a falling demand.

In connection with forecasting of business trends generally, Mr. DeBrul said that too many people are placing a child-like trust in average lines, drawn as composite curves, from data which have no logical connection. "Averages," he said emphatically, "conceal facts. We have to make different curves for different lines of business to get at true conditions. One who wishes to estimate his demand closely cannot depend on some general composite average curve or chart any more than a sea captain could depend on an average curve of wind velocity."

Statistics Are Tools to Be Used

A point emphasized by the speaker was that if when the next era of prosperity develops there are more men who have learned how and why to guide their policy, and men who also have the will power to resist the temptation to extravagance and overexpansion, there will be that much less wild inflation and less over-ordering and cancellation, less over-selling and failure to deliver, less over-borrowing and failure to pay. "Let us have more industrial statistics of the right sort," he said. "Let us publish them. Let us have more study by big business men of the real workings of the law of supply and demand. Let us realize that economics and statistics are real scientific tools, to be used."

Business Efficiency on Its Defense

"Business efficiency has been put to its defense," Mr. DeBrul emphasized in conclusion. "It has no excuse for further delay in studying the disease and the remedy. The final answer is in the hands of business men, and theirs is the final responsibility for a proper solution."

Progress in Proper Time Studies

That progress in the foundry industry demands the adoption of time study methods was a view expressed by A. J. Kramer, International Harvester Co., Chicago, in his paper on "Time Studies and Job Analysis in the Foundry." Because of the pressure of time the paper was not read, Mr. Kramer outlining, instead, the predominant thoughts of the paper. Controlling the production of the worker through equitable prices was a section emphasized. That proper job analysis was of equal importance with the time study itself, was a point stressed. Mr. Kramer's talk was received with interest and questions as to practical methods of establishing piece rates asked.

In addition to using standard times as a basis of accurate piece-work prices and increasing the efficiency and earning power of the workman, time studies should be taken to establish equality and uniformity in prices for similar classes of work in the foundry. These should also be used to seek out ways of improving equipment and to relieve the foreman of a great deal of detail and worry in matters extraneous to executive functions. The paper amplifies and discusses the value of these uses of time study in the foundry, enumerating also the qualifications for time-study observers and outlining the problem of job analysis. Several methods of basing piece work prices are explained.

Safety Measures for the Foundry

Buell W. Nutt, Safety Equipment Service Co., Cleveland, presented a paper on eye-protection and safe clothing in the foundry. A motion picture showing construction of the eye and the effect of various eye troubles and strains served to supplement Mr. Nutt's exposition. He analyzed workman's objections to wearing goggles, giving instructive suggestions as to the proper selection of such eye protectors. He also reviewed briefly the question of safe clothing in the foundry.

Because of the absence of the author, L. W. Wallace, executive secretary Federated American Engineering Societies, Washington, his paper on the "Prevention of Waste in Industry" was read by title only. A progress report of the association's committee on safety, sanitation and fire preventions was read by B. D. Fuller, Defiance Paper Co., Niagara Falls, N. Y., chairman.

American Versus British Gray Cast Iron

Discussions of the International Exchange Paper at Foundrymen's Convention—Iron for Machine Tool Castings

BESIDES an abstract of Dr. Richard Moldenke's discussion of F. J. Cook's international exchange paper, "American versus British Gray Cast Iron," published in THE IRON AGE June 15, there were two important written discussions which could not be adequately presented in the convention report in that issue. One was by George K. Elliott, chief metallurgist Lunkenheimer Co., Cincinnati, and the other by S. B. Phelps, Jones & Laughlin Steel Co., Pittsburgh. Fairly full abstracts of these two discussions follow as supplementing the reports published last week.

Discussion by George K. Elliott

As an international exchange paper Mr. Cooke's contribution is admirable because of the insight it gives Americans into important points of British gray iron metallurgy, and because of its attractive controversial possibilities.

Iron for Machine Tools

There are two kinds of iron castings,—those made from appropriate iron especially formulated for the particular casting, and those made from common, nondescript cast iron which, while broadly useful, is not

generally a felicitous choice for particular requirements. We suspect that Mr. Cook is comparing British iron of the first class with American iron of the second. If our British friends have found some American machine tool castings faulty it is possible that they belonged to the last class; especially would this be true if those castings were made under stress of war conditions.

In this country as in England it is probable that machinery builders who make their own castings have the iron under intelligent control, producing castings equal in every way to the demands of the service. I am a persistent advocate of specialization in foundry irons and therefore hail this part of Mr. Cook's paper with special satisfaction because it adds emphasis to a point all too little realized in some engineering circles.

Mr. Cook mentions the reported failures of cast iron parts in America under exposure to superheated steam. This phenomenon of growth and warping under superheated steam has been referred to by American writers with more emphasis than is justified. A search of technical literature shows that most of the references go back either directly or indirectly to three papers read before the American Society of Mechanical Engineers over 12 years ago. The number of cases reported since then is very small. Those mentioned are not to be denied but my long experience in this line convinces

Three Representatives of Foreign Foundrymen at the Rochester Convention of American Foundrymen: (Left to Right) F. J. Cook, Representing British; Marcel Remy, Representing Belgian, and Raymond Gailly, Representing French Foundrymen

me that cast iron parts made by American manufacturers, specializing in this line and making their own castings, are made of iron capable of encountering successfully the feared but somewhat overestimated superheat peril.

Strength of Cast Iron

The average of over 36,000 lb. per sq. in. tensile strength, attained by Mr. Cook, bespeaks the sterling foundryman and suggests that his iron falls within the category of special irons; at least it would be unfair to compare it with the common variety. Quite interesting would be a record of strengths of irons melted in the average English jobbing foundry. I myself have seen many hundreds of heats of iron, run without the aid of steel additions, having an average tensile strength corresponding almost identically with that obtained by Mr. Cook; the iron, however, should not be compared seriously with the product of the ordinary foundry.

Mr. Cook's tensile and "arbitration" strengths in Table I are highly commendable but should not reflect unfavorably upon American iron because his bars were cast on the main castings while the arbitration bars were cast separately. Test bars can be located so favorably in relation to the main casting, when "cast on," as to give great advantage to the bars even to the extent of giving a grossly exaggerated indication of the true strength of the iron in the main casting.

The attempt to reconcile the strength of the 1¼-in. round American arbitration bar with that of British 1-in. sq. bars by use of the factor 0.74 is not to be commended because no account seems to be taken of the quite different manner in which square and round section bars form crystals while cooling. Mr. Cook used this same device in his very able discussion of my exchange paper before the Institution of British Foundrymen last year which is referred to by him on page 8 of the present paper where he calls attention to the fact that his lowest "equivalent load" (evidently obtained through the 0.74 factor) was higher than the transverse strength of electric furnace refined iron mentioned in my paper.

Mr. Cook seems to take it for granted that the strengths mentioned in my paper were exceptional for American iron. This was far from being the case; they were not given as being the last word in cast iron test bar strengths but rather as illustrations of the improvement wrought in irons of somewhat lowly origin by treatment in the basic-hearth electric furnace. The strengths were shown in pairs so as to depict the same iron before and after treatment, and showed that the process materially improved the original cupola metal. That the strengths were exceptional was not claimed. Purposely did I avoid injecting the phenomenal, which does not seem to have been understood by several British commentators.

As to carbon in cast iron, more iron foundries in this country pay attention to it than Mr. Cook suspects. These naturally do not include the many unspecialized foundries but only such as make the better grades of castings. In making fittings for superheated steam for instance certain foundries pay great attention to the amount, the size and the distribution of free carbon.

Sulphur and Phosphorus

The sulphur question is evidently one that never will be settled to the satisfaction of everybody, especially of persons who, through geography or economy, are somewhat inescapably tied to high sulphur. To a less extent this also is true of phosphorus in considering which Mr. Cook makes the important observation that its distribution is of utmost importance, that segregated phosphide is more dangerous than the uniformly distributed.

It is my belief that high phosphorus and high sulphur will become less dangerous only when foundrymen learn a way to produce without fail, both phosphides and sulphides in a certain *optimum* degree of dispersion and of a certain critical particle size.

I am glad that Mr. Cook refers to tests of a more dynamic nature than the usual tensile and transverse tests. It is to be hoped that a more general adoption of dynamic or shock tests is near at hand for I believe these will greatly increase our knowledge of the differences between irons now apparently the same as far as the usual static tests go and yet not the same in service. I have in mind two sets of valve body castings weighing about 600 lb. each which were broken up under a foundry drop weight. One set was made from iron having about 0.08 per cent sulphur and an average of two drops of the weight were necessary to break each casting. The other set was made of the same iron but refined in the electric furnace, with sulphur at about 0.035 per cent; these castings required four or five drops each to be broken. By transverse test the second iron was about 35 per cent stronger than the first; by the drop test it was over 100 per cent stronger.

Blast Furnace Temperature and Pressure

The theory attributed to J. E. Fletcher, concerning the relative effects of hot and cold blast furnaces upon the structure and properties of gray iron, is, by way of contrast, strongly suggestive of the thought advanced by the late J. E. Johnson in his theory of oxygenated iron. Johnson's theory is that the cool running charcoal blast furnace causes a certain marked oxygenation of the iron which condition in turn, he contended, ef-

fects a compactness of the graphite formation not found in the product of the hotter running coke blast furnaces. On the other hand, Mr. Cook bases his claims for superiority in the iron from the cool running furnace, upon a quite different assumption—that through *lack* of oxidizing conditions a certain boundary-intercohesional strength is preserved in the metal.

Therefore, we are confronted with two theories, both touching upon the question of oxygen and both claiming excellent properties in iron made in cool running blast furnaces. One, however, attributes the superiority to oxygen picked up under the named conditions while the other declares the iron to be superior because the same conditions are not favorable to the taking up and retention of oxygen. Both theories touch upon fundamentals of the greatest interest, but neither is convincing and we feel justified in demanding more and better evidence.

Discussion by S. B. Phelps

Mr. Cook's paper contains many statements which American foundrymen and engineers know to be incorrect, if it is inferred that the inferior castings cited represent standard American practice.

As to the statement that large quantities of machine tools, sent over to England during the war, had poor wearing qualities and that "the cast iron was so soft as to be easily cut by a pocket knife," those knives must have been made from that American alloy, stellite. Certainly such castings were not made in foundries which generally supply the machine tool trade.

Castings for Machine Tools

The writer was the melter in a foundry in a machine tool center several years before the war and melted 50 to 60 tons of iron per day for the machine tool trade. Several grades of iron were made as well as semi-steel for parts subject to wear. In addition, chills were used very liberally on surfaces subject to excessive wear. The grain of the iron and its hardness received special attention, and frequent trips to the machine shop were customary as one method of keeping in close touch with the quality of the products. The practice mentioned was not an innovation at that period, but was general practice. The writer has seen the same care taken in other foundries making machine tool castings.

A number of new foundries and machine shops were started during the war, and all kinds of foundries were asked to make castings, regardless of their knowledge of the required products. That no doubt resulted in products in many lines being made below the usual standards. Coke, sand and metals were extremely difficult to obtain, and the grade was often unfitted for the products that had to be made, regardless of standards.

The writer was superintendent of a foundry during the war which was asked to make castings for a machine tool company. The mixtures used in that foundry were not suited for machine tools and the foundry organization, previous to the writer's time, was not familiar with machine tool requirements. It naturally occurred to me then that machine tool companies would have difficulties, if they were obliged to buy castings of any foundries that could make deliveries regardless of their lack of the special knowledge needed to produce strong machine tool castings with good wearing qualities. For long periods I had to forget about mixes for our castings, and mixed mostly by fracture and observation of the product, as it was useless to get an analysis, for we could not get the proper pig iron. The analysis of one carload of coke showed 20 per cent ash which had to be used or shut down. If we had shut down we would have lost our labor force, so we used the coke for several days and specialized on the "standing order" for scrap.

ASK FOR LOWER ORE RATES

Reduction of 10 Per Cent Has Not Halted Efforts for Further Cut

WASHINGTON, June 20.—Reduction of 10 per cent in rail rates on ore has not halted efforts of shippers and consumers to seek the greater cuts for which they have long been pressing. Railroad interests, however, incline to the opinion that the Interstate Commerce Commission will content itself with the 10 per cent reduction in rates on ore, as well as on coal and other raw materials used by the iron and steel industry.

Iron mining interests and iron and steel manufacturers, however, are insistent that the rate should be reduced further and apparently are not discouraged by the order of the commission handed down last Wednesday, denying the motion of railroads and iron and steel companies to vacate the orders of suspension with regard to rates on ex-lake and Eastern iron ore rates. This was an effort to have the commission set aside orders which suspended reduced rates on these ore shipments and which had the effect of restoring the rates effective with the general rate advance of 40 per cent on Aug. 26, 1920.

Since then these rates have been decreased as a result of the 10 per cent reduction, which has been made applicable to all iron ore shipments including those from the upper mines to Lake Superior docks. The iron mine operators and iron and steel interests will now proceed to formal hearings, seeking a reduction equivalent to 20 per cent on ex-lake ore rates and 28 per cent on Eastern ore rates. At the same time briefs have been filed for further reductions in rates from the mines to Lake Superior docks.

If additional cuts are granted in ore rates, it is obvious that allowance would be made for the 10 per cent cut which has become effective.

Through Jean Paul Muller, the Adriatic Mining Co. has filed a brief in two volumes in which are set forth exhaustive facts in favor of the original request of ore mine operators and iron and steel interests for reductions in rates on ore from the mines to upper docks. The brief maintains that the complainants have substantiated in full the accuracy of their cost study and that a reasonable rate on ore for the future from the Mesabi range should be no higher than 65c. per ton. The ore rate was $1, and under the recent 10 per cent reduction it becomes 90c.

A supplemental brief on behalf of Menominee range operators maintains that the Menominee blanket rate is absolutely necessary to permit ore from the upper part of that range to move. The brief maintains that in the fixing of a new and normal level of upper lake ore rates consonant with present conditions, the adjustment to be made by the commission should preserve the groups and relationships. It is stated that the record clearly establishes the need of a radical reduction in these rates. Another brief filed by the Steel & Tube Co. of America, et al, says that the rate from the Gogebic range to Ashland, Wis., should not be over 45c., which is precisely 50 per cent of the new rate.

No Reduction in Upper Lake Dock Handling Charges

Tariffs reducing ore rates from the mines to the upper docks became effective on all lines yesterday. To the surprise of the iron and steel trade and ore mine operators, handling and storage charges have been left unchanged so that the 10 per cent reduction applies only to the line haul rates and is not applied to handling and storage charges. This has the effect of increasing by 1c. per ton the rates that would have applied had the line haul and handling and storage charges been lumped together and the cut figured from the total, although since 1915 the line haul rates and the charges have been carried separately in the tariffs. The new rates have thus become 91c., 78c. and 69c. from the mines to the points named on page 1684 in THE IRON AGE of June 15, instead of 1c. less in each instance. The Interstate Commerce Commission sent out a notice to the carriers that reduction of handling and storage charges at upper lake ports was not authorized.

The fact that lower lake handling and dock charges have been reduced while the commission has refused similar action with regard to upper lake charges has created confusion and led to speculation as to whether the carriers will be required to restore the old charges at the lower lake ports.

Trading in North American Steel Shares Stopped

Threatened by Samuel Untermyer, counsel for the Lockwood housing investigation committee of New York, with a grand jury investigation unless it should cease trading in the stock of the proposed North American Steel Co. on a "when issued" basis, the New York Curb Market Exchange last week agreed not only to cease trading but to cancel all transactions that had been entered. Past dealings involving about 70,000 shares, valued at approximately $3,500,000, were annulled. A. B. Sturges, secretary of the curb association, issued the following statement:

At a special meeting of the board of governors held June 13, 1922, the following resolution was unanimously adopted:

Resolved, That the privilege to deal in the securities of the North American Steel Co. that was granted by the listing committee on June 2 is hereby withdrawn. No further dealing in the stock "when issued" or otherwise will be permitted until after the corporation has been duly organized or until the amount in terms of its capitalization and all other details have been settled and a complete statement thereof has been filed with and approved by the listing committee.

All past dealings in the stock will be canceled and annulled except where, after the due organization of the corporation and the issuance of its stock, the transactions heretofore made are confirmed and approved in writing by the parties thereto.

Newton Steel Co. Earnings

Net earnings of the Newton Steel Co., Youngstown, Ohio, for the four months ending April 30 last were $135,344, according to a financial statement prepared in connection with the marketing of a $750,000 bond issue by the company. Proceeds will be used for construction of six new sheet mills at the company's plant in Newton Falls, Trumbull County, Ohio.

Present orders are in excess of the expected output, and the entire plant will be put to immediate use at full capacity. It is hoped to have the additional capacity ready for production by the first of next year. The company's product consists primarily of full finished sheets; among its customers are the Ford Motor Co., Dodge Bros. Co., Buick, Chevrolet and Cadillac units of the General Motors Co.; Yawman & Erbe and the General Fireproofing Co.

The company's net tangible assets are placed at $3,035,343

Industrial Finances

The Spafford Machine Screw Works, Inc., of Hartford, Conn., has filed a voluntary petition in bankruptcy in the U. S. District Court at New Haven, showing liabilities of $40,638 and assets of $25,314.

The Ingersoll-Rand Co. report for the year ended Dec. 31, 1921, shows net income of $582,241 after interest, depreciation and inventory adjustment, equivalent after preferred dividends to $3.95 a share earned on the $10,900,035 common stock. This compares with a net income of $3,885,928, or $34.26 a share, in the previous year.

The Lomar Mfg. Co., general offices and works, Middletown, Ohio, manufacturer of the Lomar shock absorber, has been incorporated in Ohio for $100,000, all common stock. The officials are: C. W. Shartle, Jr., president and general manager, Middletown, Ohio; Tom Randolph, vice-president and director, Houston, Texas; L. L. Lomar, general superintendent, Middletown, Ohio.

The Eastern Shear Co., manufacturer of shears, scissors, New Haven, Conn., has recently filed a preliminary certificate of dissolution with the State Secretary, after having voted to dissolve the company. All claims should be mailed to L. M. Molloy, Grant Street, New Haven, Conn.

The Kirby Mfg. Co., Cleveland, at a meeting May 25, decided to increase its capital stock from $400,000 to $800,000. The present stock is all common and the new stock, a preferred issue, will be allotted to the present stockholders. The company is fairly busy at the present with orders for sugar manufacturing machinery. It has just taken an order from the Pennsylvania Sugar Co., for sugar making equipment including evaporators, crystalizers, heaters, etc., for a new plant to be erected near Miami, Fla., with a daily capacity of about 200 tons of sugar. Another recent order is from the Owosso Sugar Co., Owosso, Mich., for a plant for working up waste molasses.

The East Iron Machine Co., Lima, Ohio, is being reorganized and the capital stock will be increased from $400,000 to $500,000. C. C. Mosher one of the receivers for the old company is a leading factor in the reorganization.

A special meeting of the stockholders of the McMyler Interstate Co., Bedford, Ohio, will be held June 16 to consider reorganization of the company. The plans propose an issue of $2,000,000 of preferred 8 per cent stock and 30,000 shares of common stock without par value. Holders of present common stock will be given the choice of taking for each share one share of new preferred stock or four shares of new common stock.

A special stockholders meeting of the Sharon Steel Hoop Co., Sharon, Pa., has been called for June 7 to approve a recommendation of directors for an increase in the capital stock from $15,000,000 to $20,000,000. The increase in capitalization is to consist of 100,000 shares of cumulative preferred stock of $50 par value. Proceeds from its sale will be employed to pay existing obligations and provide additional working capital.

An involuntary petition in bankruptcy has been filed against the Eastern Brass & Ingot Corporation at Waterbury, Conn., in the United States District Court.

Plans of New Companies

The Pontiac Valve Co., Pontiac, Ill., incorporated for $500,000, of which $150,000 is preferred, is manufacturing valves.

The Elecdrive Mfg. Co., Inc., Syracuse, N. Y., will manufacture tools on contract. The company expects to close contracts within a few days.

The Kremer Metal Products Co., 721 Fulton Street, Chicago, incorporated with a capital of $50,000, is equipped for the present. Most of its work will be done in its own plant, but some contracts may be awarded.

The Ray-Di-Co. Organization, Inc., 1215 Leland Avenue, Chicago, will probably have most of its work done by contract, at least for the ensuing year.

The Combinator Co., 1423 Carroll Avenue, Chicago, has already manufactured 1600 Acme-Rite machines. The factory is fully equipped.

The Radion Mfg. Co., Norristown, Pa., is manufacturing radio parts from molded Condensite, having the molded work done outside and finishing the parts in its own shop.

The Norlipp Co., 568 West Congress Street, Chicago, does not expect to build at present and most of its work will be done by contract.

The Radiofone Corporation, 5680 Twelfth Street, Detroit, expects shortly to provide for manufacturing some of the parts of its apparatus, and, when definite action is taken, will consider machinery and other equipment. Its earlier program has been one of assembly.

The Coffield Radio Equipment Co., Ellenville, N. Y., has been incorporated to manufacture and deal in radio and electrical supplies and instruments. This company will soon be in the market to let contracts for parts to be made of molded insulation. At a later date the company may be in the market for machinery and milling supplies that enter into the manufacture and assembly of apparatus.

The Winnebago Implement & Tractor Co., 128 N. Wells Street, Chicago, incorporated for $750,000, has since been authorized to issue $3,000,000, all common. The company will manufacture the Winnebago Chief tractor, with the exception of wheels and engine, in its two plants at Pontiac and Rockford, Ill., and expects to be in full operation by July 15. The entire output has been sold for the period covering the life of the patents.

The Premier Radio Corporation, 6800 Bostwick Street, Detroit, has its factory in operation with the necessary equipment and is turning out parts and complete radio sets.

The W. F. Concannon Shear Co., Milford, Conn., is producing a high-grade tool steel scissor and shear. It is planning to make use of its entire factory and may possibly make some additions. It is not at present able to state whether it will be in the market for equipment.

The F. A. Burrows Mfg. Co., York, Pa., steam specialties, is a continuation of the Burrows Mfg. Co., which has been in business for many years. F. A. Burrows, son of the founder of the company, John J. Mace and Harry Ness acquired all the assets of the old company and took over the business a few months ago. The company manufactures boiler feed, water regulators, damp regulators, steam traps, tank valves, steam pumps and other specialties.

The Schiffl Radio & Electric Corporation, 156 Market Street, Newark, N. J., has been organized to manufacture radio sets and parts. The president and chief engineer, Charles Schiffl, was formerly chief engineer for Thomas A. Edison. The vice-president, Frank Schiffl, was construction engineer for the General Electric Co. George Henry Nolte is chairman of the board, Paul De Potter, treasurer, and Ogden Childe, secretary. The company was organized by Robert Miers. Its factory is at 51 Lawrence Street, Newark. It will probably be in the market at a later date for additional equipment.

MACHINE TOOL EXHIBIT

Four-Day Display of a Cincinnati Dealer Unusual for Wide Scope

An unusual local exhibition of machinery and supplies was held at the display rooms in Cincinnati of the E. A. Kinsey Co. No less than 66 manufacturers participated in response to the request of the Kinsey company for co-operation of the companies they represent in the Cincinnati and Indianapolis districts. The result was a display of machine tools and factory supplies on the second floor of the Kinsey office building and warehouse that brought over 6000 visitors, it is estimated, from Ohio, Kentucky, Indiana and West Virginia.

The machine tools were set up in the center of the exhibition floor, while along the sides were booths for machine shop and factory supplies. While the exhibition was not intended primarily as a selling proposition, the number of orders booked as a direct result of it was a source of gratification to the Kinsey company. The show was held on four days, June 7 to June 10, inclusive, from 9 o'clock in the morning until 9 at night. Local manufacturers of machine tools also took a keen interest in it, and all classes of employees of the industry took advantage of the opportunity presented to see the latest tools and supplies put on the market. Registration included visitors from Holland, England, France, Canada, and from such widely separated points as Los Angeles, New Orleans and Bangor, Me.

The exhibition closed on Saturday night, June 10, with a banquet at the Sinton Hotel given by the Kinsey company. About 100 attended and President W. J. Radcliffe presided. The list of exhibitors at the show, and the products displayed, follows:

Clipper Belt Lacer Co., Detroit, Clipper hooks and belt lacing machinery.

Torchweld Equipment Co., Chicago, oxyacetylene welding and cutting torches.

M. B. Skinner Co., Chicago, emergency pipe joint clamps and valve grinding tools.

Joyce-Gridland Co., Dayton, jacks.

Nicholson File Co., Providence, R. I., Nicholson files and Swiss files.

J. H. Williams & Co., Brooklyn, drop forge wrenches, lathe tools, clamps, pipe vises and pipe wrenches.

Pike Mfg. Co., Pike, N. H., oil stones, slicks and implement sharpening stones.

Clark Equipment Co., Buchanan, Mich., Celfor high speed drills and reamers.

Dreis & Krump Mfg. Co., Chicago, carryall overhead conveyance system.

L. S. Starrett Co., Athol, Mass., hack saw blades, tools and gages.

McCroskey Tool Corporation, Meadville, Pa., quick change chucks and inserted blade reamers.

Kidd Drawn Steel Co., Aliquippa, Pa., drawn steel of all shapes.

Minnesota Mining & Mfg. Co., Chicago, abrasive paper and cloths.

Jacobs Mfg. Co., Hartford, Conn., Jacob drill chucks.

Allen Mfg. Co., Hartford, Conn., Allen set screws.

Standard Tool Co., Cleveland, carbon and high speed drills and reamers, chucks.

Wahlstrom Tool Co., Brooklyn, quick change chucks and automatic tapping chucks.

Union Mfg. Co., New Britain, Conn., lathe chucks.

Chadwick & Trefethen Co., Critchley expanding reamers.

Lumen Bearing Co., Buffalo, machine bronze.

Chisholm & Moore Mfg. Co., Cleveland, hoists and trolleys.

G. E. Johannsen, Inc., Poughkeepsie, N. Y., measuring blocks, gages and micrometers.

R. & J. Dick Co., Inc., Passaic, N. J., balata belts.

Buffalo Pulley & Caster Co., Inc., Buffalo, leather pulleys and leather tired casters.

American Pulley Co., Philadelphia, Steel split pulleys.

Transmission Ball Bearing Co., Buffalo, Chapman ball bearing hangers; boxes for line shafts.

Brown & Sharpe Mfg. Co., Providence, universal milling machine, cylindrical grinding machine, automatic screw machine and universal tool makers vise; high speed and carbon cutters, end mills and machinists tools.

Norton Co., Worcester, Mass., grinding wheels, alundum and crystolen grains, and refractories.

Indianapolis Brush & Broom Co., Indianapolis, brooms and brushes.

Greene, Tweed & Co., New York, Palmetto packing.

E. Horton & Sons Co., Windsor Locks, Conn., lathe and drill chucks.

Kiel Flexible Pipe Joint Co., Lousiville, Ky., flexible pipe joints.

International Electric Co., Indianapolis, electric glue heater.

Jones & Lamson Machine Co., Springfield, Vt., Hartness die heads and chasers.

Brogan Mfg. Co., Bangor, Me., steel tapes.

Macleod Co., Cincinnati, sand blasting equipment.

Gardner Machine Co., Beloit, Wis., motor driven disk grinding machine, motor driven polishing lathe, G. I. A. disks and disk grinding accessories.

Electric Arc Cutting & Welding Co., Newark, N. J., electric arc cutting and welding machines and apparatus.

Bartlett Co., Nashua, N. H., Greenard arbor presses.

J. D. Wallace & Co., Chicago, motor driven band saw, motor driven joiner and motor driven universal saw table.

Bellevue Industrial Furnace Co., Detroit, high speed gas furnace.

Shore Instrument Co., New York, pyroscope and scleroscope.

Rhodes, Mfg. Co., Hartford, Conn., combination shaper and slotting machine.

R. K. LeBlond Machine Tool Co., Cincinnati, multi-cut lathe.

Oliver Instrument Co., Adrian, Mich., drill grinding machine and filing machine.

Smith & Mills Co., Cincinnati, high speed back geared shaper.

Bradford Machine Tool Co., Cincinnati, quick change gear engine lathe, featuring Horton hand and power differential scroll chucks.

Minster Machine Co., Minster, Ohio, high duty drilling machine.

Milholland Machine Co., Indianapolis, geared head turret lathe.

Landau Machine & Drill Press Co., turret sensitive drilling and tapping machine.

Adolph Muehlmatt, Cincinnati, motor driven bench sensitive drilling machine.

American Gauge Co., Dayton, amplifying gage.

Burke Machine Tool Co., Conneaut, Ohio, bench tapping machine and motor driven bench drilling machine.

Van Norman Machine Tool Co., Springfield, Mass., Relio motor driven garage grinding machine.

U. S. Drill Head Co., Cincinnati, multiple spindle drill heads.

Fosdick Machine Tool Co., Cincinnati, sliding head upright drilling machine, gear-box driven; Fosdick-Pierle motor driven sensivtive drilling machine; Fosdick superspeed motor driven sensitive drilling machine.

Metal Cutting Machine Co., Springfield, Vt., cutting off machines.

Williams Tool Corporation, Erie, Pa., pipe threading machine.

Peerless Machine Co., Racine, Wis., Peerless universal sawing machine, motor driven.

Diamond Machine Co., Providence, grinding machines.

Wilmarth & Marmon Co., Grand Rapids, Mich., surface grinding machine.

Rivett Lathe & Grinder Co., Boston, radius grinding machine.

P. L. Billingsley Co., Cincinnati, portable universal woodworking machine with accessories.

Ingersoll-Rand Co., New York, power driven air compressor and portable drilling machine.

Peck, Stow & Wilcox Co., Southington, Conn., sheet metal machinery.

Kirk & Blum Mfg. Co., Cincinnati, exhaust systems.

Coming Meetings of American Electrochemists

The board of directors of the American Electrochemical Society recently appointed Dr. John A. Mathews, president Crucible Steel Co. of America, to fill the unexpired term of C. G. Schluederberg as vice-president. George K. Elliott, chief metallurgist the Lunkenheimer Co., Cincinnati, was appointed to the unexpired term of Dr. C. G. Fink as manager.

The date for the fall meeting has been changed to Sept. 21, 22 and 23 at Montreal, Canada, with Hotel Windsor the headquarters. Two symposiums are scheduled for this meeting: "Endosmosis," in charge of F. A. Lidburg, and "Industrial Heating," in charge of Bradley Stoughton.

Subjects for the spring meeting in 1923 are to be "Electrode Potentials," in charge of William G. Horsch, and "Production and Application of the Rare Metals," in charge of Bradley Stoughton. These are to include vanadium, tungsten, cobalt, molybdenum, zerconium, cerium, uranium, tantalum, calcium, etc.

Mechanical Exposition in Belgium in 1923

An international exposition of mechanical and electrical industries will be opened at Ghent, Belgium, on June 1, 1923, and will be held from June to October. The exposition will be held in the former buildings of the Ghent World's Exposition of 1913. The bureau of foreign and domestic commerce at Washington, in directing the attention of American manufacturers to this exposition, declares its belief that it will offer a splendid opportunity for American companies to exhibit machinery and equipment which they believe will be able to compete with products of foreign manufacture.

The Matthews Advertising Co., St. Louis, has just published a booklet entitled, "How to Figure a Mixture," which gives valuable data on the use of Southern and Northern irons. The proportion of scrap is also figured and average analyses of a few kinds of scrap are included.

The National Tube Co., Pittsburgh, is erecting a galvanizing plant 76 x 120 ft. and also a slag plant at its Lorain, Ohio, works.

Machinery Markets and News of the Works

PRICE ADVANCES COMING SOON

Some Machine-Tool Manufacturers Will Announce Higher Quotations Shortly

Slow but Steady Improvement in Business in Most Markets, but Conditions Are Spotty

At least three or four machine-tool manufacturers will announce advances in selling prices within the next few weeks. While business has scarcely improved sufficiently to justify an advance on that basis alone, it is stated that rising costs of raw material and labor make higher prices imperative in some instances.

One machine-tool manufacturing company which started work at its plant recently was obliged to pay machinists 15 cents an hour more than had been estimated. Since present selling prices of machine tools were established pig iron and steel have advanced sharply, injecting another higher cost factor into the situation.

A continued improvement in machine-tool sales is reported from several of the leading selling centers, but the expansion in business is slow. Expectations of large railroad buying have not yet been fulfilled. Several large railroad lists issued at Chicago, which have been pending for some time, are still inactive and it is not definitely known in the trade when purchases will be made.

The New York Central Railroad has issued inquiries for a dozen or more tools and its motive power department has a large list of requirements, which will probably be issued piece-meal during the next several months. The Lorain, Ashland & Southern Railroad has inquired at Cleveland for four or five tools.

The Studebaker Corporation, South Bend, Ind., has bought a few tools, but its larger requirements are still held up. C. H. Wills & Co., Marysville, Mich., have bought a few screw machines.

Among new inquiries is one from the Mathew Stock Car Co., Chicago, for 14 items.

June sales thus far by a Cleveland manufacturer of turret lathes are 50 per cent greater than during the same period in May.

Export business in tools is not active, but some improvement is noted. Four boring machines were shipped to Belgium a few days ago, the first shipment of importance to Europe that the manufacturer of these machines has made since the war.

New York

NEW YORK, June 20.

The New York Central Railroad has come out with additional inquiries for machine-tool equipment and its motive power department has on file a large list of requisitions, which it is expected will be the basis for inquiries extending over the next several months. Among the tools inquired for within the past few days are four horizontal turret lathes, three vertical turret lathes, radial drills, three axle lathes, one 28-in. shaper, one bolt cutting machine, one sensitive drilling machine, one driving wheel press, 96-in. and 600-ton capacity. The American Locomotive Co. has bought a wheel press, 96-in. and 400-ton capacity.

Otherwise the local machine-tool market continues without new developments of importance, though some sellers detect an increasing interest among manufacturers in new tool equipment. Some sellers report that their volume of sales is slowly expanding.

Increased activity is noticeable in both locomotive and electric overhead cranes in this district. Several good inquiries have been issued the past ten days. One of these is from Phoenix Utilities Co., New York, for a 40-ton electric traveling crane. Business in handpower cranes is dull, although a number of inquiries for small capacity cranes are pending. Prospects for increased sales of locomotive cranes are brighter than for some time, as the scarcity of the used product is becoming increasingly severe. Prices quoted on electric overhead cranes still cover a wide range. One list of cranes, which closed the past week brought out bids from 17 builders on two 10-ton cranes 46-ft. 9¾ in. and 46-ft. 5⅛-in. spans, ranging from $9,850 to $15,600. The order was awarded to the sixth highest bidder.

Among the recent purchases are: Narragansett Electric Lighting Co., Providence, R. I., two 10-ton, electric cranes, 46-ft. 9¾-in. and 5⅛-in. spans to the Shaw Electric Crane Co., and one 1½-ton, 38-ft. 9-in. span and two 1-ton, hand power cranes with electric hoists to the James H. Tower Iron Works, Providence, R. I.; Clark Thread Co., Newark, N. J., a 15-ton, 33-ft. 6-in. span, 1-motor overhead crane and the Carolina Engineering Construction Co., Boston, a 30-ton hand power crane for Tennessee, from the Niles-Bement-Pond Co.; Boston Elevated Railways Co., Boston, a 15-ton, electric locomotive crane from the Industrial Works.

The Tennessee Copper & Chemical Co., New York, is reported to have purchased a 10-ton crane from the Cleveland Crane & Engineering Co.

The Studebaker Corporation, 1700 Broadway, New York, has awarded contract to the United Fireproofing Co., 8 West Fortieth Street, for a three-story service and repair building on Dean Street, Brooklyn, 190 x 220 ft., to cost $275,000. A complete machine works will be installed.

The plant of the Electric Auto-Lite Co., Poughkeepsie, N. Y., a subsidiary of the Willys-Overland Co., manufacturer of automobile lighting and starting equipment, has been acquired by Clement O. Miniger, Toledo, Ohio, heretofore president of the company, for $300,000. The other Auto-Lite plants at Toledo and Fostoria, Ohio, have also been purchased by the same interests, with total investment involving more than $3,000,000. The company will be reorganized and all three plants placed in immediate operation.

The State Hospital Commission, Capitol Building, Albany, N. Y., will receive bids until June 28, for a cold storage and refrigerating plant at the State Hospital, Central Islip, N. Y., including electrical, mechanical and refrigerating machinery, etc. L. F. Pilcher, Albany, is State architect; L. M. Farrington is secretary.

The City Iron Works, 444 West Thirty-eighth Street, New York, has plans under way for a new one-story plant on Sixtieth Street, Brooklyn. Alfred A. Berbue, 220 West Forty-second Street, New York, is architect.

The Degnon Realty & Terminal Improvement Co., 51 East Forty-second Street, New York, has plans under way for extensions in its terminal plant, Long Island City, to total about 1,000,000 sq. ft. The project, including the installation of equipment, is estimated to cost in excess of $500,000. Michael J. Degnon is president.

The Henry G. Loeber Co., 151 East 126th Street, New York, manufacturer of soda fountains and fixtures, has plans nearing completion for a new two-story factory, 60 x 95 ft., on Buckley Street, Long Island City, estimated to cost about $25,000.

The Merchants' & Manufacturers' Association, Grand Central Palace, New York, is arranging for the establishment of a vocational training department in a portion of the Palace building, Forty-fifth and Forty-sixth streets, Park and Lexington avenues, to cost in excess of $75,000, including equipment, to be occupied by the United States Veterans Bureau, with headquarters in the Arlington Building, Washington, D. C.

Alexander Pelli & Co., 509 East 120th Street, New York, operating a marble works, have filed plans for a new one-story plant, 105 x 157 ft., on Albion Street, Elmhurst, L. I., with cutting finishing, polishing and other operating departments including hoisting and conveying equipment, etc., estimated to cost close to $50,000.

The Lehigh Valley Railroad Co., Jersey City, N. J., will commence the immediate installation of a crane and crane runway at its property, foot of Chapel Avenue, estimated to cost about $50,000.

The Perth Amboy Oil & Terminal Co., First National Bank Building, Perth Amboy, N. J., has acquired property at Woodbridge, for its terminal and distributing plant. A preferred stock issue of $175,000 is being sold, of which about $130,000 will be used for the construction of the works and the purchase of machinery, pumping equipment, tanks, etc. Luke Mooney is president, and John E. Toolan, secretary.

A vocational department will be installed in the new high school to be erected near Sunset Lake, Asbury Park, N. J., estimated to cost about $600,000. Guilbert & Betelle, 546 Broad Street, Newark, N. J., are the architects.

Fire June 12, destroyed a portion of the plants of the Daniel Pepay Iron & Wire Works, and Thomas Brown & Co., manufacturer of automobile lighting equipment, 1620 Willow Avenue, Jersey City, N. J., each occupying a floor of the two-story building with loss estimated at about $25,000.

A. Loori, 545 Pavonia Avenue, Jersey City, N. J., has had plans prepared for a two-story automobile service building and repair shop, 50 x 175 ft., at 862-64 Newark Avenue, to cost about $45,000. Christian H. Ziegler, 75 Montgomery Street, is architect.

The Bayonne Steel Products Co., 223 West Nineteenth Street, New York, has acquired property at 264-68 Jelliff Avenue, 75 x 105 ft., adjoining a site recently acquired. It is improved with a one and two-story building, which will be used in connection with its new plant to be erected here, plans for which have been prepared.

H. R. Chupurdy, 221 West Fifty-third Street, New York, manufacturer of automobile tops and equipment, has organized the Chupurdy Auto Coach Works, Inc., to manufacture automobile bodies, buses, etc. The company is headed by H. R. and E. R. Chupurdy.

Philadelphia

PHILADELPHIA, June 19.

The Pennsylvania Equipment Co., Norwood, Pa., is in the market for a second-hand closed cylindrical steel tank, 5/16 in. thick or heavier, 10,000 to 15,000 bbl. capacity for underground storage.

Streff & Elmer, 1416 North Second Street, Philadelphia, have filed plans for a new two-story machine shop at Hope and Jefferson streets.

A two-story automobile service and repair works, 80 x 90 ft., for company trucks and cars, estimated to cost about $60,000, will be constructed by the Supplee-Wills-Jones Co., Twenty-sixth and Jefferson streets, Philadelphia.

The S. Rochlis Iron Works, 1518 North Fifth Street, Philadelphia, manufacturers of ornamental iron products, will install new shearing machinery, bending machines and other equipment.

A vocational department will be installed in the three-story junior high school to be erected at Oxford and Eighth streets, Philadelphia, estimated to cost about $700,000. The Board of Education, Nineteenth Street, is in charge.

The Atlantic Refining Co., 3144 Passayunk Avenue, Philadelphia, with refineries at Pittsburgh and Franklin, Pa., and Brunswick, Ga., is disposing of a bond issue of $15,000,000, a portion of the proceeds to be used for extensions and improvements. J. W. Van Dyke is president.

The Beaumont Radio Phone Co., 1326 Arch Street, Philadelphia, manufacturer of wireless equipment and instruments, has leased the entire building at 114 North Juniper Street, for a new plant.

Motors, conveying machinery and other equipment, will be installed in the two-story addition to be built at the plant of the Colonial Biscuit Co., Twelfth and Brown streets, Philadelphia, 65 x 65 ft. Bids are being asked.

A one-story power house will be erected by the R. B. Dutt Co., Inc., Philadelphia, at its textile dyeing works, 1726-64 North Mascher Street.

The Collings Carriage Co., Arch and Federal Streets, Camden, N. J., manufacturer of automobile bodies, has plans under way for extensions and improvements in its works. Lackey & Hettle, 5 Hudson Street, are architects.

A vocational department will be installed in the new high school to be erected at Downingtown, Pa. The Board of Education is in charge.

Daniel F. Guinan, Mahanoy City, Pa., will commence the immediate erection of a new four-story automobile service and repair building at Harrison and Centre streets, Pottsville, Pa., to be 60 x 120 ft.

The Keystone Carbonic Gas Co., Inc., Harrisburg, Pa., manufacturer of commercial oxygen and gas products, will commence the immediate erection of a new plant on property recently acquired at Highspire, near Harrisburg.

The McGann Mfg. Co., Inc., a recently formed corporation, capitalized at $100,000 fully paid in, has acquired the property of the U. S. Dryer & Machinery Co., Inc., at Richland Avenue and the Pennsylvania Railroad, York, Pa., where it will do steel plate work and manufacture tanks, dryers, rotary kilns, sugar machinery, lime and hydrating plants and castings. Robert G. McGann, Chicago, who was vice-president Ruggles-Coles Engineering Co. for over 20 years, is president. William J. Kuntz, vice-president, treasurer and general manager, formerly held the same office with the Ruggles-Coles company and was connected with the Steacy-Schmidt Mfg. Co. for 20 years. The new company is in the market for a 10 to 15-ton crane, 50 ft. span, and a 10-ft. or 10 to 14-ft. vertical boring mill.

The Carbondale Machine Co., Carbondale, Pa., advises that neither its plant nor equipment were damaged by flood June 3. It is operating at 95 per cent of capacity.

New England

BOSTON, June 19.

The machine-tool market continues quiet and the best that can be said is that new equipment is beginning, after weeks of inactivity, to show signs of life. Buying is still far from brisk, but is sufficient to lend considerable encouragement to manufacturers' representatives and dealers. The improvement apparently is based on a growing belief that standard tools are about as low as they will be this year, also that some users have larger funds available for plant improvements than six months ago, and to the slow but certain elimination of desirable used equipment in New England. Much of the used equipment offered for sale by manufacturers going out of business or by those having a surplus stock, has been quite thoroughly culled over until only poor conditioned tools remain. Dealers say they are obliged to spend considerable time locating special tools wanted, and that customers are beginning to buy new machinery rather than wait until suitable second-hand tools can be found. No marked improvement in sales of new tools is expected this summer, but the trade is optimistic regarding fall business.

Sales the past week in this district include four radial drills, a Bullard boring mill and a Potter & Johnson shaper, all new tools, to the General Fire Extinguisher Co., Providence; a new 28-in. monitor Flather lathe to a Connecticut valve manufacturer; smaller new Flather lathes to two other Connecticut concerns; a new No. 2 Consolidated press to a Boston manufacturer; and a new 3-ft. radial drill and a new grinding machine to New Hampshire interests, in addition to about an equal number of used production machines. Small screw machines are in urgent request from radio apparatus manufacturers. One New England producer has recently added several hundred machinists in an effort to keep up with its small screw machine business. A Connecticut firm is inquiring for eight new machines, including four turret tools.

The Narragansett Electric Lighting Co., Providence, R. I., has purchased two 10-ton cranes from Manning, Maxwell & Moore, Inc., bids ranging from $9,850 to $15,600, but the successful bidder bid was considerably above the low bid submitted. The company also bought one 1½-ton and two 1-ton hand cranes with electric hoists from the James H. Tower Iron Works, Providence.

J. H. Ginns, machine department, New Britain, Conn., trade school, has been granted leave of absence to supervise the equipping and organization of a new trade school at Ansonia, Conn.

The Meeker Foundry, South Norwalk, Conn., was recently destroyed by fire, with the loss estimated at $50,000 to $75,000. The plant began operations in 1887 and will be rebuilt immediately. Edward S. Meeker is the principal stockholder.

Arrangements are practically completed whereby the Pratt & Whitney Co., Hartford, Conn., will produce machinery for the manufacture of the main parts of a device for use in connection with automobiles to be placed on the market by the Odograph & Ododeict Co.

The Hartford Auto Parts Corporation, capitalized for $430,000, has been incorporated under Connecticut laws to acquire the property and business of the Hartford Automotive Parts Co., Hartford, Conn., recently dissolved. Lucius

F. Robinson, his son, and Francis E. Jones are the incorporators.

E. A. Johnson, Myron E. Vaughn and Stephen Jones, Boston, are president, vice-president and treasurer, respectively, of the Ironside Foundry, Inc., Ware, Mass., capitalized for $50,000, which will manufacture special castings. The former street railroad carhouse, Gilbertville Road, has been purchased and will be remodeled. M. T. Eckmann will be shop manager. Mr. Vaughn, who for three years was superintendent Rodney Hunt Machine Co., Lawrence, Mass., will be resident manager.

The New Departure Mfg. Co., Bristol, Conn., ball bearings, bells, etc., announces that preparations for the installation of machinery at a new branch plant at Meriden, Conn., will start immediately. Production will start next fall.

The plant of the National Metal Seal Co., Morrills Corner, Portland, Me., last week was destroyed by fire with loss estimated at $40,000. New production facilities will be secured as soon as possible.

The Farrand Mfg. Co., Inc., Boston, capitalized for $200,000, has incorporated under Massachusetts laws to manufacture clincher bolts and metal products. Offices at present are at 136 Federal Street, Room 404. George L. Edwards, Cambridge, is president, and John Threlfall, Wellesley Hills, treasurer.

The city of Providence, R. I., will start work shortly on the addition to the trade school on Dodge Street. It will be one-story 70x125 ft. of brick and steel.

The Cumberland County Power & Light Co., Portland, Me., has made application for permission to issue bonds for $1,000,000, the proceeds to be used for the construction of a new steam-operated electric generating plant at South Portland.

The American Gill Screw Co., Providence, R. I., has awarded contract to the E. H. Bigney Co., 49 Weybosset Street, for a new one-story plant at Poe and Eudora streets.

The Electrical Products Mfg. Co., Providence, R. I., manufacturer of electrical equipment, has leased property at 24 Fountain Street, for extensions.

The Manchester Traction, Light & Power Co., Manchester, N. H., is disposing of a bond issue of $2,059,000, a portion of the proceeds to be used for electric plant and system extensions and improvements.

Fire, June 15, destroyed a portion of the plant of the Meeker's Union Foundry Corporation, Norwalk, Conn., manufacturer of iron castings, etc., with loss estimated at about $60,000, including equipment.

Power equipment, motors, electric controlling devices, etc., will be installed in the new printing plant, 100 x 100 ft., to be erected by the R. S. Peck Co., Hartford, Conn., on Franklin Street.

A one-story power house will be constructed by the Wanskuck Co., Providence, R. I., at its textile mill.

A one-story power house will be erected by the Columbia Narrow Fabric Co., Shannock, R. I., in connection with a number of new buildings at its textile mills. Lockwood, Greene & Co., 60 Federal Street, Boston, are architects.

The City Council, Wallingford, Conn., is planning for extensions in its municipal electric power plant to cost about $30,000.

The Presbrey-Leland Co., Inc., Barre, Vt., which planned to build a new stone cutting plant at Brattleboro, Vt., requiring steel construction among other things, cannot secure the site until the end of the year, and the letting of contracts has been postponed until that time.

Cleveland

CLEVELAND, June 19.

Machine-tool builders report a slow but steady improvement in demand. There is a fair volume of small lot buying by manufacturers of automobiles and accessories, makers of electrical equipment and plumbers' brass goods. June sales by a local builder of turret lathes show a 50 per cent gain over May. This company during the week received an order from England for a large turret lathe, the first British order for 18 months. The demand for automatic screw machinery is increasing. In addition to a number of orders for from one to three machines, a local manufacturer sold seven machines to an Indiana automobile plant. C. H. Wills & Co., Marysville, Mich., who recently purchased some equipment, placed an additional order the past week for seven small screw machines. The demand for machinery from the electrical field is picking up as a result of an increased demand for small motors for household appliances.

Sales by dealers were not numerous during the week. They report a better volume of inquiries, however, particularly for the larger machines. One industrial project is developing which is expected to result in the purchase shortly of about $50,000 worth of machine tools. In the railroad field the Northern Pacific has purchased a large turret lathe from a local manufacturer and the Lorain, Ashland & Southern Railroad, through W. D. Hallidie, Lorain, Ohio, purchasing agent, has an inquiry out for an 18-in. x 26-ft. lathe, 24-in. heavy duty shaper, 23-in. heavy duty drilling machine, 12-in. tool grinder and a 30-hp. motor. The Cleveland Board of Education is inquiring for a universal saw bench with a 36 x 36-in. table for the West Technical High School. The American Vitrified Products Co., Akron, is inquiring for two 27-in. lathes, a vertical boring mill and a shaper.

The demand for used machinery is fair and reports are more general that the supply of good used tools is becoming scarce.

The Studebaker Corporation has acquired a new site on East Twenty-fifth Street, Cleveland, on which it will erect a four-story automobile service station at an estimated cost of $250,000. Plans are being prepared by the H. K. Ferguson Co.

The Ohio Crankshaft Co., 982 East 152d Street, Cleveland, has acquired a site at 6507 Park Avenue, on which it will erect a one-story factory, 58 x 200 ft.

The Mansfield Vitreous Enamel Co., Mansfield, Ohio, manufacturer of vitreous enameled stove parts, has commenced the erection of a factory addition, 80 x 136 ft.

The Toledo Aluminum, Bronze & Castings Co., Toledo, Ohio, recently organized, has purchased the factory at Locust and Water streets, occupied by the Detroit Stoker Co., and plans to enlarge the building or erect a new one for foundry purposes. The company has a capital stock of $25,000 and was organized by W. F. Brier, F. H. Schill, C. M. Kistner and O. K. Rudow.

The Canton Rim Co., Canton, Ohio, which recently purchased the plant formerly occupied by F. R. Fortune Tool Co., Wooster, Ohio, will enlarge the building.

The Sands Mfg. Co., 5407 Sweeney Avenue, Cleveland, has placed contract for a two-story factory, 65 x 100 ft., for the manufacture of domestic water heaters.

The Visible Pump Co., Findley, Ohio, which has moved from New Haven, Ind., to the former Grant plant in Findley, has completed the equipment installation and commenced operations for the manufacture of gasoline pumps. W. A. Hollinton is president.

W. D. Scott & Sons, Zanesville, Ohio, have completed the equipping of a building for the manufacture of ventilating fans and for the repair of mining machinery. The plant was formerly occupied by the Gearwood Works.

Bids for the purchase of the plant of the Spencer Metal Products Co., Medina, Ohio, will be received by the trustee in bankruptcy up to July 1. Stockholders are considering purchasing the plant and reorganizing the company.

The Ohio Pumping Machinery Co., Akron, Ohio, has been incorporated with a capital stock of $100,000. This Ohio corporation has been formed to operate the plant that will be removed to Akron from Fitchburg, Mass., where it is operated under the name of the Blake Fitchburg Pump Co.

The Actuating Farm Gate Co., St. Paul, Minn., has purchased the plant formerly occupied by the National Melting Co., Elyria Ohio, and will move to that city. It will manufacture steel and iron gates, fence and ornamental steel and wire goods. J. S. Green is president.

The York Ohio Ice Machine Co., Cleveland, will erect a factory at 2708 Washington Avenue at an estimated cost of $50,000.

Cincinnati

CINCINNATI, June 19.

There were few developments in the machinery market the past week and the number of orders booked was not such as to give any great encouragement to manufacturers. The situation, however, is very much improved over the early months of the year. No outstanding purchases were made during the week and new inquiries were also light. Orders are confined chiefly to single machines, but the business booked is from widely scattered points and from no particular branch of the metal working trade.

Automobile purchases the past week were for a number of special machines for rapid production purposes. The Studebaker Corporation bought a few machines of a special type and is expected to close on a list in the near future. The Erie Railroad is also expected to place orders for approximately 25 machines within the next week or two. The recent inquiry from the Navy Department for 12 machines for the Pacific fleet has been withdrawn after much effort had been spent on it by local manufacturers. It is understood that these tools will be taken from stocks in Government warehouses. The Navy Department, however, has issued a new inquiry for a number of machines, including six lathes for San Diego, Cal., and it is expected that

better luck will be experienced with this inquiry than the last one.

It is reported that a manufacturer in this district recently booked an order for approximately 60 miscellaneous machines from the Mexican Government, shipments of which have started. The Mexican Government is reported to have made purchases of metal-working equipment, amounting to $300,000, for a number of State schools, practically all of which was placed with Ohio manufacturers. Local dealers report only fair activity, with extreme difficulty experienced in closing quotations.

The Crawford & McCrimmon Co., Brazil, Ind., manufacturers of hoisting and hauling engines, pumps, etc., are seeking a new location and it is reported that negotiations with the Portsmouth, Ohio, Chamber of Commerce for a site in that city are drawing to a satisfactory conclusion.

The Ideal Concrete Machinery Co., Cincinnati, manufacturer of concrete machinery and tumbling barrels, has purchased property on Spring Grove Avenue and is contemplating the erection of a new plant to cost approximately $100,000.

The Lima Locomotive Co., Lima, Ohio, is planning enlargements and additions, which will increase its capacity 50 per cent. It is proposed to spend approximately $1,500,000 for the improvements and stockholders will be asked to authorize an issue of 300,000 shares of common stock. A meeting of the stockholders has been called for July 14.

The Ohio Metal & Mfg. Co., 335 East Monument Avenue, Dayton, Ohio, manufacturer of sheet metal goods, has purchased the property of the A. Ach & Sons Co. and will operate both plants in the future. Additional warehouses will be erected, plans for which are being prepared.

The Holdcraft Electric Co., Hazard, Ky., has been incorporated with a capitalization of $20,000 to do a general electrical business. It contemplates the erection of a power plant in a town in southeastern Kentucky, plans for which are being prepared. A. D. Holdcraft is president and general manager.

The Stenpho Co., 316 U. B. Annex, Dayton, has been incorporated with a capitalization of $15,000 to manufacture steel signs and name plates. C. C. Cosner is president and general manager.

Chicago

CHICAGO, June 19.

The local machine tool market shows very little change. A fair number of orders for one or two machines have been booked, but no action has been taken on the large inquiries pending. The Santa Fe is expected to close for its equipment some time this week and liberal orders are looked for from the Studebaker Corporation in the near future. The Mather Stock Car Co., Chicago, has issued the following list:

One air compressor with 800 cu. ft. capacity.
Two 3-head bolt threading machines.
One shear with capacity up to 1¼ x 8 in.
One 60-lb. Bradley hammer.
One 30-in. drill press.
One punch with capacity ⅞-in. hole through ¾-in. steel.
One double end emery grinder for 3-in. x 18-in. wheels.
One forge blower to furnish air for coke fires and oil furnaces.
One nut tapper.
One air hoist of 1-ton capacity and 16 to 20-ft. lift.
One oil burning forge for heating rivets.
One shear, capacity 1¼ x 4-in.

The Great Northern Railroad, F. A. Bushnell, St. Paul, purchasing agent, is in the market for 350 spout hoist machines complete with door hoist mechanism; 350 cam shaft levers and door tripping mechanism; 36 steel motor pinions; 36 steel spur gears; 36 9-in. bearings; 18 5-in. bearings; 4030 lineal ft. of cold rolled steel line shafting 2 7/16 in. in diameter in 36 runs with compression couplings. Delivery is required by March 1, 1923.

The crane market shows more activity. The Whiting Corporation has recently booked the following orders: One 15½-ton crane for the Northeastern Power Co., Johnson's Falls, Wis., one 5-ton crane for the Michigan Gas & Electric Co., Three Rivers, Mich., one 5-ton crane for the Cadillac Foundry Co., Cadillac, Mich., and a 1½-cu. yd. bucket traveling crane, with 38-ft. span, bought by Fairbanks, Morse & Co., for a reinforced concrete coaling station and cinder pits which it is constructing for the Chesapeake & Ohio at Clifton Forge, Va.

The Trimm Radio Mfg. Co., 24 South Clinton Street, Chicago, recently incorporated with $25,000 capital stock, has leased space at the above address for the manufacture of radio apparatus. It has all of the equipment required at present. The officers are W. H. Trimm, president; V. P. Arnold, vice-president, and H. T. Bennett, secretary.

Fire recently damaged the plant of the Allsteelequip Co., Aurora, Ill., the estimated loss being $65,000.

J. R. Ulrich will open an acetylene welding repair shop at 216 DuPage Street, Elgin, Ill. He has been conducting a business at Joliet which will be continued.

The H. J. Frank Foundry & Machine Co., Davenport, Iowa, will erect a $6,000 addition to its plant.

The Fort Dodge Gas & Electric Co., Fort Dodge, Iowa, will build a new electric generating plant to cost $600,000. Work will be started not later than Oct. 1.

The proposition to erect a municipal electric light plant in Kewanee, Ill., was recently carried at a special election.

The Lavelle Foundry Co., Anderson, Ind., has commenced the construction of an addition, 75 x 100 ft., to house its cleaning and inspection departments.

The Sullivan Machinery Co., Chicago, manufacturer of mining and oil well drilling machinery, expects to award contracts soon for a plant at Michigan City, Ind., instead of at LaPorte, as announced last week. It will consist of two two-story units, 400 x 550 ft. and 60 x 400-ft. respectively, and will cost $1,000,000.

The Ford Motor Co., Detroit, Mich., is reported to be negotiating for a site for an assembling plant at Hammond, Ind.

The William F. Bleck Co., manufacturer of sash, doors and blinds, 1846 North Lamon Avenue, Chicago, is taking bids on a one and two-story factory, 180 x 200-ft., on North Lamon Avenue, north of Bloomingdale Avenue.

Shea, Smith & Co., printers, 322 Federal Street, Chicago, have let contract for a four-story plant, 86 x 150-ft., at the northeast corner West Congress Street and Ashland Avenue, to cost $250,000.

The Vesta Battery Co., southwest corner Indiana Avenue and Twenty-first Street, Chicago, is making alterations to its plant to cost $8,000.

The Chicago Gas Plate & Range Co., 1654 North Rockwell Street, Chicago, recently incorporated with $25,000 capital stock, is the successor to the Novelty Aquarium Co., and will continue to manufacture gas plates and ranges and various sheet metal products, especially plumbers' catch basin dippers. The company has two plants, an assembling shop at 1654 North Rockwell Street, and a machine shop at 1758 North Rockwell Street. It is in the market for a squaring shear and an 8-ft. brake. The officers are Morris Myer, president; Michael Lester, vice-president and treasurer, and Hyman Myer, secretary.

The Chicago Hardware Foundry Co., 546 West Washington Boulevard, Chicago, has awarded a contract to the Clark Construction Co., 130 North Wells Street, for a one-story addition to its plant at North Chicago, 60 x 100 ft., with extension, 40 x 110 ft., estimated to cost about $50,000, including equipment.

A one and two-story automobile service and repair works, 157 x 300 ft., for company trucks and cars, will be constructed on Lawrence Street, Chicago, by the Fair Department Store, estimated to cost in excess of $200,000. Mundie & Jensen, 139 South La Salle Street, are architects.

The Northwest Paper Co., Cloquet, Minn., has awarded contract to the Siems, Helmers & Shaffener Co., Guardian Life Building, St. Paul, Minn., for a new paper mill, estimated to cost close to $500,000, including machinery.

The Twin City Motor Car Co., 163 West Sixth Street, St. Paul, Minn., will take bids at once for a two-story service building, with machine shop, 60 x 160 ft., at Fifth and Exchange Streets. Toltz, King & Day, Pioneer Building, are architects. J. P. Upham is vice-president and general manager.

The Farmers' Mutual Packing Co., Jotter, Iowa, will commence the immediate erection of a new three story and basement refrigerating and cold storage plant, 90 x 135 ft., on Oregon Street, Muscatine, Iowa, estimated to cost about $150,000. A portion of the structure will be equipped for general packing house operations, including conveying machinery, etc., Gardner & Lindberg, 140 South Dearborn Street, Chicago, are architects and engineers.

The Mutual Oil Co., Casper, Wyo., is planning for the construction of a new pipe line from Salt Creek to Glenrock, Wyo., with series of pumping plants, estimated to cost about $250,000, including machinery.

A one and two-story power house, 70 x 120 ft., estimated to cost $60,000, will be constructed by Hetzel & Co., Chicago, at their packing plant on Mohawk Avenue. Headquarters are at 1743 Larrabee Street. Schmidt Garden & Martin, 104 South Michigan Avenue, are architects.

The Public Service Co. of Northern Illinois, Joliet, Ill., is disposing of a bond issue of $7,000,000, a portion of the proceeds to be used for extensions and improvements in electric plants and system.

The Multi- Electrical Mfg. Co., Chicago, manufacturer of electrical bushings, fittings, etc., has removed its plant from 703 Fulton Street to 1845 West Fourteenth Street. It is

planned to develop about 50 per cent. increase in capacity at the new location, where considerably increased floor space is provided. William T. Casey is vice-president.

The Rath Packing Co., Waterloo, Iowa, will commence the immediate erection of a new one-story power house estimated to cost about $35,000. A new packing house will also be built.

The J. H. Markle Motor Co., 1726 O Street, Lincoln, Neb., will install a number of machine tools and bench tools in its machine shop, as well as forge equipment and other mechanical apparatus.

The Eastern Minnesota Light & Power Co., Pine City, Minn., has preliminary plans under way for a new local power house. It is also planning for extensions and improvements in the power house at Milaca, Minn. R. F. Allen is general manager.

Pittsburgh

PITTSBURGH, June 19.

The coal strike is still considered an adverse factor in closing machine tool orders on which prices have been submitted. One concern states orders are practically accepted for several cranes and another for considerable steel works machinery, but both contracts are held up, the purchasing departments stating they prefer to wait until something definite develops in the coal strike. There is an accumulation of such business among local machinery dealers.

The bulk of inquiries coming in continues to be for cranes, but many are for heavy machine tools from four or five of the local leading steel companies and several from the Youngstown, district. The Northern Engineering Works, Detroit, has sold to the Follansbee Brothers Co. for its Toronto, Ohio, sheet mill, a 2-motor, 7½-ton heavy mill type hoist, and to the Greenville Steel Car Co., Greenville, Pa. a 10-ton electric crane. The Milwaukee Electric Crane & Mfg. Co. has sold to the Koppel Car Repair Co., Koppel, Pa., a 10-ton electric crane with 60-ft. span. The Shepard Electric Crane & Hoist Co., has sold to the American Sheet & Tin Plate Co. for its Farrell, Pa., works, a 3-motor, pulpit control, magnetic handling jib crane, also a 2-ton electric hoist to the American Steel & Wire Co. for delivery at Cleveland, and a 2-ton electric hoist for the Morrow Mfg. Co., Wellston, Ohio. This company also has orders for a considerable number of other electric hoists and jib cranes. The Westinghouse Electric & Mfg. Co. has placed with a local interest one 5-ton and one 10-ton electric cranes for delivery at East Pittsburgh.

The Board of Public Education, Fulton Building, Pittsburg, is in the market for some machinery equipment, bids on which have gone in and were to be opened June 20. This inquiry comes from C. M. McKee, superintendent of supplies, and includes four scroll band saws, wheels 30-in. in diameter and 2-in. face, with rubber facing; also four 3-hp. motors, 3-phase, 220 volts, a.c. 1800 r.p.m., 60-cycle; one saw bench, single arbor, table to be about 36-in. x 42-in.; also one 12-in. rip saw, one 12-in. cut off and one 12-in. cleaner tooth combination saw; nine 12-in. screw cutting engine lathes with 5-ft. bed, to be belt driven, single back gear.

A local interest states that it has sold recently to a large independent steel company, considerable heavy equipment, consisting of lathes, planers and other tools.

It is stated that not in several years have there been as many inquiries for machinery equipment as local dealers are figuring on at present. Should the coal strike be settled within a few weeks the Pittsburgh machinery market seems to be all set for good business over the second half of the year.

The Stonecrete Corporation, 6023 Penn Avenue, E.E., Pittsburgh, is inquiring for the following used machines: One small and one large drill press, one small and one large engine lathe, one light snaper and one shaper capable of 38-in. stroke, one planer capable of stroke of 8 ft., one boring mill, one emery wheel stand, one wood lathe for pattern shop, one band saw for pattern shop, one punch and shear; also belting, shafting and motors for a small shop. The company manufactures concrete machinery.

The North American Radio Corporation, 422 First Avenue, Pittsburgh, has been organized to manufacture radio equipment. Its factory is at 220 Second Avenue, Pittsburgh.

The Standard Sanitary Mfg. Co., Bessemer Building, Pittsburgh, manufacturer of enameled iron products, etc., has plans nearing completion for a one-story machine shop and plant at New Brighton, Pa., 100 x 200 ft., estimated to cost about $100,000, including equipment. W. H. Garver is company engineer.

The National Supply Co., Union Building, Pittsburgh, manufacturer of oil-well equipment, etc., with headquarters at Toledo, Ohio, has awarded a contract to W. F. Trimble, 1719 Pennsylvania Avenue, for a two-story and basement building, 105 x 105 ft., to cost about $50,000.

The Westinghouse Electric & Mfg. Co., East Pittsburgh, is completing plans for a one-story metal-working shop at Trafford City, Pa., 50 x 135 ft. B. H. Prack, Keystone Building, Pittsburgh, is architect.

A vocational department will be installed in the new high school to be erected at Woodlawn, Pa., estimated to cost about $300,000, including equipment. Carlisle & Sharrer, Jenkins Arcade, Pittsburgh, are architects.

The Atlantic Refining Co., Franklin, Pa., is planning to rebuild the portion of its plant, operated as the Eclipse Oil Works, recently destroyed by fire with loss estimated at close to $100,000, including tanks and other equipment.

A group of affiliated electric companies is being organized by B. U. McClintock, A. W. Robertson and J. R. McNary, 435 Sixth Street, Pittsburgh, and associates, to construct and operate electric power plants and systems in different districts, indicated by the company names, which are the Neville Township Light Co.; the Robinson Township Light Co.; the Kennedy Township Light Co.; the Stowe Township Light Co.; the Kilbuck Township Light Co., and the Coraopolis Electric Co.

An automobile service and repair works for company trucks and cars will be erected by the Great Atlantic & Pacific Tea Co., Jersey City, N. J., at Dallas Avenue and the Pennsylvania Railroad, Pittsburgh, in connection with a warehouse at the same location. The project will cost about $500,000.

The Erie Burial Case Co., Twentieth and Peach Streets, Erie, Pa., will commence the immediate erection of a new two-story plant to cost about $300,000, including machinery.

Motors and other electrical and mechanical equipment will be installed in the three-story addition, 84 x 105 ft., to be erected by the Newspaper Printing Co., Gazette Square, Pittsburgh, estimated to cost close to $200,000, including equipment.

The West Penn Power Co., West Penn Building, Pittsburgh, will make extensions in its transmission system to cost in excess of $60,000, including equipment.

The Union Township Board of Education, Brookville, Pa., will commence the immediate erection of a new one-story and basement vocational school, 50 x 150 ft., at Corsia, Pa. The Emmett E. Bailey Co., Chambers Building, Oil City, Pa., is architect.

The Union Machine & Supply Co., West Union, W. Va., recently organized, will take bids at once for its new machine shop, including machine tools and other equipment. It will also install a complete electric power plant. W. D. Gribble is president, and W. L. Lynn, secretary and manager.

The Grant Automatic Flow Valve Co., Sisterville, W. Va., has plans nearing completion for a new factory to manufacture valves, to be one-story, 80 x 100 ft., and estimated to cost approximately $40,000. F. J. McCoy is secretary.

The Peck's Run Coal Co., Buchannon, W. Va., has tentative plans in preparation for rebuilding its power plant recently destroyed by fire, with loss estimated at about $25,000.

The Town Council, Rivesville, W. Va., has plans under way for extensions in the municipal waterworks, to include electrically-operated pumping machinery, power equipment, etc.

Electric pumping machinery, power plant equipment and other apparatus will be installed in connection with the proposed new sewer system to be constructed by the City Council, Morgantown, W. Va., estimated to cost close to $750,000. A bond issue is being arranged.

Detroit

DETROIT, June 19.

The Swedish Crucible Steel Co. of Canada, Ltd., Windsor, Ont., states that the report that it has been sold to the Reo Motor Co., Lansing, Mich., for branch works Canadian trade, is not true. The Reo Motor Co. has leased one of the buildings of the Swedish Crucible Steel Co., but the building has no connection with the foundry of the Crucible company. The Swedish Crucible Steel Co. has various divisions operating at Windsor and expects to continue in active operation.

The General Mfg. Co., Detroit, manufacturer of presses, reports an improved demand. It has recently shipped large presses to the Packard, Cadillac and Maxwell automobile companies, and has received additional orders for two large presses each from the Cadillac Motor Co. and the Chevrolet Motor Co.; two small presses for Cadillac, one for Willys-Overland and one for the Morse Chain Co., Detroit.

Edward Mills, Midland, Mich., and Samuel Fair, Saginaw, Mich., have acquired the plant of the Cooley Castings Co., Saginaw, from the Weber Real Estate Co., which recently purchased the property at auction. The new owners will remodel the foundry and install new equipment. A company will be organized to operate the plant.

The Ford Motor Co., Highland Park, Detroit, has acquired

about 10 acres near New Orleans, as a site for a new assembling plant, with daily capacity of about 150 cars. It is estimated to cost $400,000, including machinery. The company is having preliminary plans drawn for a new one and two-story plant at Flat Rock, Mich., for glass manufacture, estimated to cost in excess of $750,000, including machinery. Albert Kahn, 1000 Marquette Building, Detroit, is architect. The Ford company is said to have purchased about 100 acres at East Chicago, Ind., for about $700,000, and will use a portion of the site for the erection of a new plant.

Fire, June 12, destroyed a portion of the shops of the Minneapolis, St. Paul & Sault Ste. Marie Railway Co., Gladstone Mich., including locmotive house, machine and repair shops, etc., with loss estimated close to $1,000,000, including equipment. Headquarters of the company are at Minneapolis, Minn.

The Detroit United Railway Co., Jefferson and Bates streets, Detroit, will soon commence the erection of the superstructure for its new one-story car shop, 125 x 285 ft., on Hamilton Avenue, estimated to cost about $65,000.

Edward Smith, Saginaw, Mich., has acquired a local brass foundry and will make extensions and improvements and install additional equipment. It is planned to commence production in about 60 days.

Baltimore

BALTIMORE, June 19.

Lyon, Conklin & Co., 13 Balderstone Street, Baltimore, manufacturer of tinware, metal products, etc., has awarded a general contract to George B. Monmonier, 1711 McCullen Street, for its new plant, consisting of a main four-story structure, 230 x 430 ft., with smaller buildings, estimated to cost about $350,000, including machinery.

The Columbus Power Co., Columbus, Ga., affiliated with the Columbus Railway Co. and the Gas Light Company of Columbus, has arranged an appropriation of $500,000, for plant extensions and improvements by the three companies during the present year.

The Post Quartermaster, Marine Barracks, Parris Island, S. C., will receive bids until June 26, for 50 pounds of copper magnet wire; eight pressure gages; two vacuum gages; two pressure and vacuum gages; two recording gages; one recording vacuum gage, and one thermometer.

The City Council, Hobgood, N. C., has tentative plans under consideration for a new municipal electric power house. E. L. Bradley is city clerk in charge.

The Lock Joint Pipe Co., 1123 Broadway, New York, is planning for the removal of its plant at Norfolk, Va., to Cumberland, Md., for the manufacture of heavy concrete tubes.

The Board of Harbor Commissioners, Wilmington, Del., has authorized the immediate preparation of plans and specifications for loading machinery, conveying and other mechanical equipment to be installed at the new terminal now in course of erection on the Christiana River. Charles H. Gant is executive secretary of the board.

A vocational department will be installed in the new two-story and basement high school addition to be erected on Franklin Avenue, Vandegrift, Va., estimated to cost about $155,000. W. G. Eckles, Lawrence Savings & Trust Building, New Castle, Pa., is architect.

The Peoples' Ice & Fuel Co., Rutherfordton, N. C., recently organized, is planning for a new ice-manufacturing and cold storage plant. R. L. Taylor heads the company.

The Stuart Cold Storage Co., Stuart, Va., is planning for the installation of new cold storage machinery and equipment in a local building. J. F. Reynolds is secretary.

The Mexican Petroleum Corporation, Baltimore, will commence the immediate construction of a new power and pumping plant on First Avenue, Curtis Bay, 36 x 85 ft.

The Athens Saw & Planing Mill Co., Athens, Ga., recently organized, is arranging for the installation of a saw mill, molder, planer and other wood-working machinery, with power house equipment, in an existing building. V. J. Moss is president and treasurer.

The Staunton Power Co., Boydton, Va., is planning for extensions and improvements in its plant and system to cost about $50,000. A new transmission line will be constructed from Halifax to Charlotte. E. L. Baptist is secretary.

William J. Tickner & Son, North and Pennsylvania avenues, Baltimore, have awarded a contract to Milton Davis & Son, 902 West Thirty-sixth Street, for the erection of a new one-story automobile sevice building, with machine shop department, estimated to cost about $55,000.

The City Council, Radford, Va., is arranging a bond issue of $115,000, the proceeds to be used for extensions and improvements in the municipal electric power plant, including the installation of equipment. William E. Gilbert is mayor, in charge.

A one-story electric power house will be constructed by the Thistle Cotton Mills, Inc., Ilchester, Md., in connection with its proposed plant, 60 x 200 ft., estimated to cost in excess of $75,000. Charles M. Sears is secretary.

Power equipment, mixing and conveying machinery, etc., will be installed in the new three-story plant, 40 x 140 ft., to be erected by the Union Chemical Products Co., Chamber of Commerce Building, Pittsburgh, at Buena Vista, Va., estimated to cost about $50,000.

The Newton Giant Incubator Co., Harrisonburg, Va., has plans under way for a new factory, 75 x 115 ft., estimated to cost about $30,000. A list of machinery for installation has been arranged. John P. Burge is manager.

The Felstone Co., Haywood Building, Asheville, N. C., is planning for the installation of equipment at its plant for the manufacture of concrete blocks and kindred specialties.

The Town Council, Kings Mountain, N. C., is taking bids for pumping equipment, air compressors, electric motors, etc., for use in connection with the installation of a new waterworks system. George E. Lovell is town clerk.

The Fibre Board Container Co. 3200 Williamsburg Avenue, Richmond Va., will commence the immediate erection of a one-story addition, 30 x 175 ft. D. J. Donati is president.

The Rutledge Oil Co., Rutledge, Ga., whose plant was recently destroyed by fire, has as yet made no definite plans for rebuilding. The address of the company has been incorrectly given as Madison, Ga.

The Standard Sanitary Mfg. Co., Atlanta, Ga., advises that it is not erecting an addition to its plant and does not maintain a manufacturing establishment in that city.

Buffalo

BUFFALO, June 19.

The Niagara, Lockport & Ontario Power Co., Marine Bank Building, Buffalo, is arranging for additions and improvements in the plant and system of the Olean Electric Light & Power Co., Olean, N. Y., recently acquired, estimated to cost close to $750,000, including new transmission line, etc.

The Kimberly-Clark Paper Co., Packard Road, Niagara Falls, N. Y., has awarded contract to Harding & Crea, White Building, Buffalo, for two one-story buildings, 50 x 100 ft., and two structures, 50 x 120 ft., estimated to cost about $65,000, exclusive of equipment. Headquarters of the company are at Neenah, Wis.

The Universal Instrument & Metal Co., Vestal, N. Y., is planning for the installation of new equipment at its plant, including special machinery. R. Mulliner is president.

The Allan Mfg. & Welding Corporation, Buffalo, has leased a portion of the building of the Albany Garage, Washington Street, for the establishment of a plant to manufacture electric transformer equipment, and for electric and oxy-acetylene welding. The company is now located at 163 Adams Street.

The Buffalo General Electric Co., Electric Building, Buffalo, will build a new electric-switching plant, 200 x 400 ft., at its steam power house, Tonawanda, N. Y. P. F. Sellers is general superintendent.

The Peckham Vocational School, 321 Peckham Street, Buffalo, will build a new one-story building for vocational instruction, 30 x 96 ft., with L extension, 22 x 36 ft., to include machine shop, wood-working and other mechanical departments. William W. Miller is president.

The transforming station of the hydro-electric Commission, Chippewa, Ont., was destroyed by fire June 16, with a loss of $200,000.

Indiana

INDIANAPOLIS, June 19.

The Self Lay Block & Machine Co., manufacturer of concrete block machinery, Vincennes, Ind., has completed its factory and installed machinery. The company contemplates enlarging its plant later in the year and will at that time require additional machine-tool equipment.

The Acme Works, Inc., 420 South Harding Street, Indianapolis, manufacturer of castings, etc., will commence the immediate erection of a one-story addition, 50 x 150 ft., to be used as a metal and wood pattern shop and other service. Peter Lambertous is president.

The Beaver Products Co., Beaver Road, Buffalo, N. Y., a subsidiary of the Beaver Board Companies, Inc., recently organized, has acquired the plant of the Vulcanite Roofing Co., Anderson, Ind. The works will be continued in full operation, and extensions and improvements are planned.

The Southern Indiana Gas & Electric Co., Evansville, Ind., will commence the erection of an addition to its generating plant on Division Street, to include the installation of a new 7500-kw. turbo-generator with auxiliary operating machinery,

estimated to cost $500,000. It will make other extensions and improvements to cost approximately $200,000.

Robert H. Hassler, Inc., 1335 Naomi Street, Indianapolis, manufacturer of automobile shock absorbers for Ford and other automobiles, has awarded contract to the Builders' Construction Co., 340 North Meridian Street, for a two-story and basement works, 37 x 120 ft., estimated to cost $40,000.

The Inland Water Ways Co., Louisville, Ky., establishing a local water terminal, has acquired the former plant of the Sweeney Foundry & Shipbuilding Co., Jeffersonville, Ind., purchased about a year ago by the First National Bank, Louisville, under bankruptcy proceedings. The new owner will remodel and improve the property; a portion will be retained for iron-working and other manufacturing, and the remainder given over to new docks and buildings for terminal purposes, the latter to be equipped with freight handling and conveying machinery, etc. It has a frontage on the Ohio River of about 1100 ft.

The Gulf States

BIRMINGHAM, June 19.

The Cunningham Machine Works, Shreveport, La., recently organized, has acquired a local building and will establish a plant to manufacture acetylene equipment. Machine tools and other equipment will be installed. L. T. Cunningham is president.

Edward Pickett and Clabourne Andrews have acquired the Star Welding Works, New Orleans, and will organize a company to operate the plant. Plans are under way for extensions and improvements.

The Milldale Ice Co., Panama Park, Jacksonville, Fla., has plans in progress for rebuilding its ice-manufacturing plant, recently destroyed by fire, with loss estimated at about $40,000. S. S. Simmons is general manager.

The City Commission, Jacksonville, Fla., has plans under way for extensions and improvements in the municipal electric power plant to cost about $275,000. A new 10,000-kw. generator and auxiliary machinery will be installed. The Scofield Engineering Co., Commercial Trust Building, Philadelphia, Pa., is engineer.

The Nashville Bridge Co., Nashville, Tenn., has acquired 10 acres at Bessemer, Ala., as a site for a new branch steel fabricating plant to give employment to about 500.

The City Council, West Palm Beach, Fla., will install new pumping machinery and other equipment in connection with its proposed high pressure water system for fire service, estimated to cost about $100,000, including machinery.

The Electric Motor Co., Tampa, Fla., has plans under way for an addition to manufacture electric-driven elevators of heavy type. It is estimated to cost close to $50,000.

A vocational department will be installed in the two-story high school to be erected at Bremond, Tex. Edward W. Roberts is secretary of the School Board.

The Corporation Ice Co., Lozano and Constant streets, Tampa, Fla., has tentative plans under consideration for rebuilding the portion of its ice-manufacturing plant destroyed by fire June 9, with loss estimated at about $100,000, including machinery.

The Common Council, St. Petersburg, Fla., will dispose of a bond issue of $300,000, the proceeds to be used for the construction of a municipal electric power plant and system.

Fire, June 8, destroyed a portion of the plant of the Longbell Lumber Co., Quitman, Miss., with loss estimated at about $100,000, including drying machinery, transfer cars and other equipment.

The Southwestern Gas & Electric Co., Shreveport, La., will build a new automobile service works and machine shop, 45 x 140 ft., for company trucks and cars.

The Missouri, Kansas & Texas Railroad, St. Louis, has asked for bids for new construction and repair shops at Denison, Tex., to be used primarily for freight car work. The plant will comprise machine shops, metal-working shop, locomotive house, etc., and is estimated to cost close to $800,000. The company will continue its locomotive shops at Denison for the present, but later will remove this plant to the new location. The shops at Sedalia, Mo., will be maintained.

J. V. Park, Aliceville, Ala., is organizing a company to build and operate a new hydro-electric generating plant on the Sipsey River, estimated to cost about $65,000.

The Swift Lumber Co., Knoxo, Miss., is planning for the erection of a saw mill, wood-working plant, etc., in the vicinity of Atmore, Ala., with initial output approximating 75,000 ft. per day. G. R. Swift is president and general manager.

The Dallas Gas Co., Dallax, Tex., has plans under way for a new one-story machine shop for meter repair and other general work. It will also build a service and repair works for company trucks and cars.

Freight handling and other mechanical equipment will be installed in the new freight houses to be constructed at Dallas Tex., by the Atchison, Topeka & Santa Fe Railroad Co., Kansas City, Mo., estimated to cost about $350,000.

The Henry L. Vaughn Automobile Co., Commerce Street, Fort Worth, Tex., has tentative plans under consideration for rebuilding the portion of its service and repair works, recently destroyed by fire with loss approximating $100,000, including equipment.

The Natchez Ice Co., Natchez, Miss., is planning for the erection of a new ice-manufacturing plant on Canal Street. A cold storage and refrigerating plant will also be built.

The Schwing & Shingle Co., Plaquemine, La., is inquiring for a 24-in. lathe.

The Pacific Coast

SAN FRANCISCO, June 13.

A vocational and manual arts building will be erected at the new Union High School, Glendale, Cal., estimated to cost about $600,000. A power house will also be constructed. John C. Austin, 1125 Baker-Detwiler Building, Los Angeles, is architect.

The Calexico Cotton Compress Co., Cal., has tentative plans under consideration for rebuilding its plant, destroyed by fire June 8, with loss estimated at about $300,000, including machinery.

The Wayne Oil Tank & Pump Co., Fourth and Perry Streets, San Francisco, has awarded contract to the Dinwiddie Construction Co., Crocker Building, for a new one-story building, estimated to cost about $15,000.

The board of directors, Banta-Carbona Irrigation District, Tracy, Cal., is arranging for a bond issue of $696,000 for the erection of 7 new electrically-operated pumping plants and system. Centrifugal pumping units and auxiliaries, estimated to cost about $225,000, will be installed.

Plans are being prepared for the erection of a new vocational shop at the Union High School, Whittier, Cal., estimated to cost about $75,000. Myron Hunt, 1107 Hibernian Building, Los Angeles, is architect.

The Bittleston Co., 335 South Los Angeles Street, Los Angeles, is planning for the installation of new machinery at its works for tinware manufacture.

The Federal Light & Traction Co., Tucson, Ariz., is planning for extensions and improvements in its power plant and system to cost about $150,000, operated under the name of the Tucson Gas, Electric Light & Power Co.

An electric traveling crane will be installed in the new transit shed to be erected by the Board of Harbor Commissioners, Aberdeen, Wash. Plans for the structure are being prepared.

The Emerson Hardwood Co., and the Eastern & Western Lumber Co., Portland, Ore., are planning to rebuild the portions of their plants, recently destroyed by fire, with loss estimated at about $100,000, including equipment.

The Pacific Malleable Iron Co., Gresham, Ore., is planning for the erection of a new one-story foundry.

The Utah Light & Traction Co., Salt Lake City, Utah, has disposed of a bond issue of $12,471,000, a portion of the proceeds to be used for extensions and improvements.

The Pacific Mills, Ltd., Vancouver, B. C., has plans under way for a new hydroelectric generating plant at Ocean Falls, B. C., to be used in connection with its pulp and saw mill at this location, estimated to cost about $500,000, including ma-

The Central South

ST. LOUIS, June 19.

The St. Louis Wire & Iron Co., 926-28 Chouteau Avenue, St. Louis, will take bids at once for a two-story and basement addition, 50 x 140 ft., to cost about $35,000. Theodore R. Fiesler is president.

The Nelson Mfg. Co., Deerfield, Wis., manufacturer of stoves, furnaces, etc., has acquired property, 130 x 140 ft. at Little Rock, Ark., for a new branch plant.

The City Council, Liberal, Kan. will soon call for bids for the erection of a new municipal electric power plant, with initial capacity of about 1000 hp. The Ruckel Engineering Co., Hutchinson, Kan., is engineer.

The Paola Mill & Elevator Co., Paola, Kan., has tentative plans under consideration for the rebuilding of the portion of its plant, destroyed by fire, June 10, with loss estimated at $75,000, including machinery.

The Somerville Iron Works, North Chattanooga, Tenn., has filed plans for two additions, comprising a one-story foundry, 150 x 300 ft., and one and two-story charging and operating building, 30 x 80 ft.

The Consolidated Steel & Iron Corporation, Stuart, Mo., has plans under way for the establishment of works to manu-

facture cast iron sewer pipe, and other iron and steel products.

A vocational department will be installed in the new three-story and basement high school to be erected at Hill City, Kan., estimated to cost about $135,000. William H. Saylor & Co., 306 Mutual Building, Kansas City, Mo., are architects.

The C. F. Lutes Window Glass Co., Caney, Kan., has preliminary plans under consideration for rebuilding the portion of its plant, destroyed by fire, June 8, with loss estimated at about $200,000, including machinery. The new works will cost approximately a like amount.

The Spaulding Electric Co., 220 East Eleventh Street, Kansas City, Mo., recently organized, is planning for the immediate establishment of a factory to manufacture wireless equipment and electrical specialties, and to include a repair department. A list of equipment is being arranged. L. W. Spaulding is president, treasurer and general manager.

The Tennessee Eastern Power Co., Johnson City, Tenn., will soon commence the construction of a new hydro-electric generating plant, with initial capacity of about 4500 hp., estimated to cost in excess of $325,000, including machinery.

The Board of Commissioners, Artesian Water Department, Memphis, Tenn., will take bids until July 6, for equipment for a new steam generating and pumping plant, including two 15,000,000-gal. horizontal cross compound pumping engines, with condensing auxiliaries; two 15,000,000-gal. steam turbines, reduction gear driven centrifugal pumping units, with condensing auxiliaries; four two-stage air compressors, with capacity of 2700 cu. ft. per min., direct-connected to cross compound or single engines, with condensing auxiliaries; four 350-hp. horizontal, longitudinal drum watertube boilers and superheaters, to operate under 225-lb. pressure; four underfeed, automatic mechanical stokers, with driving mechanism. Fuller & McClintock, 421 Produce Exchange Building, Kansas City, Mo., and 170 Broadway, New York, are engineers; W. H. Harrison is general superintendent.

The Arkansas Foundry Co., Little Rock, Ark., has awarded contract to the Hermann McCain Construction Co., Little Rock, for a new foundry, to replace the one recently destroyed by fire. F. I. Brown is general manager.

The Oklahoma Public Service Co., Mayo Building, Tulsa, Okla., will commence the immediate erection of an addition to its power plant, to cost about $1,000,000, including machinery. Sargent & Lundy, 72 West Adams Street, Chicago, are engineers.

The Palace Garage 136 North St. Paul Street, Wichita, Kan., is planning for the installation of new machine tools and other equipment, including lathe, drill press, emery grinder, etc.

The Ocoee Copper Co., 1135 Volunteer Life Building, Chattanooga, Tenn., will commence the immediate erection of its new plant on property recently acquired near Ducktown, Tenn., estimated to cost about $200,000, including machinery and power equipment. J. I. Garter is president.

The Common Council, Locust Grove, Okla., has approved a bond issue of $20,000, for extensions and improvements in the municipal electric plant and system.

The City Clerk, Hazard, Ky., will receive bids until June 29, for pumping machinery and auxiliary equipment to be used in connection with extensions and improvements in the municipal waterworks. The J. N. Chester Engineers, Union Bank Building, Pittsburgh, are engineers. J. W. Craft is mayor.

J. O. Coleman, 106 North Third Street, Wichita, Kan., will install new grinding and drilling equipment, etc., in connection with a machine shop.

Canada

TORONTO, June 19.

Improved industrial activities are having a stimulating effect on the demand for machine tools in this market. Business in general equipment lines continues to hold well up to the levels of the past few weeks with some very favorable orders booked for two or three machines from numerous customers. It is the general opinion that sales for June will be somewhat ahead of those for May. Inquiries also continue in increasing volume. While there has been very little buying of late on railroad account, manufacturers and municipal governing bodies have been entering the market quite freely for supplies for additions and replacement purposes. The greatest improvement, however, has been in woodworking equipment and there is still considerable business of this kind before dealers. Used equipment is moving well, but new lines show more activity and are rapidly coming into stronger favor. The demand for small tools has improved considerably the past week and dealers are again experiencing a brisk call for these products.

Caron Brothers, Inc., Montreal, has been incorporated with a capital stock of $3,000,000 and will take over the assets and undertakings of Caron Brothers. It is the intention of the new company to manufacture light and power sets in its Longue Pointe plant, which has a floor area of 200,000 sq. ft. The plant of the International Mfg. Co., has also been acquired for contemplated expansion. At present no additions will be made, but later it proposes to erect a foundry.

The London Bridge Works, Ltd., London, Ont., a subsidiary of the Standard Steel Construction Co., Welland, Ont., has been incorporated with a capital stock of $100,000 and will shortly commence operations there. A building, 80 x 100 ft., will be erected, which will have a capacity of 250 tons of fabricated steel per month and about 50 men will be employed at the start. In addition to the fabricated steel business the company will build a warehouse for the distribution of steel products, including structural steel shapes, plates, bars, rivets, bolts, nuts etc. The officers and directors are: T. J. Dillon president; George M. Reid, vice-president; J. J. Breen, secretary-treasurer; Philip Pocock, E. S. Little, Col. I. Leonard, C. J. Madgett, and H. C. Baker, directors.

The Lackawanna Tubes, Ltd., Welland, Ont., has been incorporated with a capital stock of $525,000 to take over the properties of the Welland Machine & Foundries, Ltd., Welland. It has about 30 men on its payroll, but when full production is attained 250 will be employed. Construction of a new mill, 80 x 400 ft., has started and contracts for some equipment have been placed. The old foundry is being repaired. The main product will be seamless steel tubes. L. R. Weeks of New York is president of the company and active management will be in his hands.

Hillis & Sons, Ltd., Halifax, N. S., iron founder and machinist, is rebuilding its plant which was wrecked by explosion in 1917, and expects to have it completed by August. It will consist of a main building, 70 x 100 ft., with wing 30 x 70 ft., one and two stories respectively, to be of concrete, steel and brick construction. It is estimated that the cost of the new plant will be $50,000.

A machine room large enough to accommodate two paper machines is being erected by the Belgian Industrial Company, Ltd., Shawinigan Falls, Que. The machines to be installed will be 228 in. wide and each is expected to produce 80 tons of newsprint per 24 hours. At present only one machine will be installed, which is expected to be in operation by January, 1923. Nothing has yet been decided regarding the second machine. The estimated cost of the building with one machine and auxiliary equipment is $700,000.

The Westminster Paper Mills, Ltd., New Westminster, B. C., has been incorporated with a capital stock of $250,000 by M. F. Herb. Peshtigo, Wis.; A. M. Onkels, New Westminster, B. C., and others. It has secured a site on the Indian Reserve and will make an initial expenditure of $100,000 on a plant to specialize at first in the manufacture of tissue paper.

J. H. Grant & Co., Montreal, have been awarded contract for the construction of a rolling mill and electrical substation for the Eugene F. Phillips Electrical Works, Brockville, Ont.

The Premier Paper & Power Co., recently incorporated, has purchased the H. Croix Paper & Lumber Co., acquiring the latter's watershed and 26,000 acres of pulp land. It proposes to build a new paper mill and power plant to cost approximately $1,500,000, according to a statement by Philip H. Moore, managing director of the Premier Paper & Power Co., 91 Hollis Street, Halifax, N. S. The plant will be erected about 35 miles from Halifax and the equipment will include two hydraulic turbines, generating approximately 3300 hp., four water wheels to drive grinders and one newsprint machine. It is expected that contracts for the erection of the plant will be let on the cost-plus plan, although nothing definite has so far been decided. George F. Hardy, New York, is consulting engineer.

The A. D. Porter Mfg. Co., Ltd., is installing machinery and equipment in a building on Hobson Street, Galt, Ont., to manufacture steel and brass products, specializing in brass bands. It also proposes to install equipment later for the manufacture of shoemakers' hardware and hardware for the furniture trade.

The Wabash Railway, Railway Exchange Building, St. Louis, will equip a water filling station for locomotives at Glencoe, Ont., and lay a three-mile pipe line and install electrically operated pumping equipment. O. W. Carrick, Decatur, Ill., is engineer.

The general contract for the erection of a pulp mill at Three Rivers, Que., to cost $4,000,000 for the Three Rivers Pulp & Paper Co., Ltd., Canada Cement Building Montreal, has been let to the Thompson Starrett Co., Ltd., 910 Drummond Building, Montreal. J. J. O'Sullivan is chief engineer.

H. Hudron, chairman Waterworks Commission, Kincardine, Ont., is receiving bids for motors, pumps, reinforcing steel etc., for waterworks.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipments in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

	Per Lb.
Bars:	
Refined iron bars, base price	2.58c.
Swedish bars, base price	7.00c.
Soft steel bars, base price	2.58c.
Hoops, base price	3.63c.
Bands, base price	3.23c.
Beams and channels, angles and tees 3 in. x ¼ in. and larger, base	2.68c.
Channels, angles and tees under 3 in. x ¼ in., base	2.58c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger	2.60c.
(Smooth finish, 1 to 2½ x ¼ in. and larger)	2.80c.
Toe-calk, ½ x ⅜ in. and larger	3.40c.
Cold-rolled strip, soft and quarter hard	6.25c. to 7.25c.
Open-hearth spring steel	3.50c. to 6c.
Shafting and Screw Stock:	
Rounds	3.35c.
Squares, flats and hex	3.85c.
Standard cast steel, base price	12.00c.
Extra cast steel	17.00c.
Special cast steel	22.00c.

Tank Plates—Steel

¼ in. and heavier	2.68c.

Sheets

Blue Annealed

	Per Lb.
No. 10	3.48c. to 3.63c.
No. 12	3.53c. to 3.68c.
No. 14	3.58c. to 3.73c.
No. 16	3.63c. to 3.83c.

Box Annealed—Black

	Soft Steel C. R., One Pass, Per Lb.	Blued Stove Pipe Sheet, Per Lb.
Nos. 18 to 20	4.00c. to 4.30c.	.....
Nos. 22 and 24	4.05c. to 4.35c.	4.60c.
No. 26	4.10c. to 4.40c.	4.65c.
No. 28	4.20c. to 4.50c.	4.75c.
No. 30	4.45c. to 4.75c.	.....

No. 28 and lighter, 36 in. wide, 10c. higher.

Galvanized

	Per Lb.
No. 14	4.30c. to 4.60c.
No. 16	4.45c. to 4.75c.
Nos. 18 and 20	4.60c. to 4.90c.
Nos. 22 and 24	4.75c. to 5.05c.
No. 26	4.90c. to 5.20c.
No. 27	5.05c. to 5.35c.
No. 28	5.20c. to 5.50c.
No. 30	5.70c. to 6.00c.

No. 28 and lighter, 36 in. wide, 20c. higher.

Welded Pipe

Standard Steel

	Black	Galv.
½ in. Butt..	—56	—40
¾ in. Butt..	—61	—47
1-3 in. Butt..	—63	—49
3½-6 in. Lap.	—60	—46
7-8 in. Lap..	—56	—34
9-12 in. Lap.	—55	—33

Wrought Iron

	Black	Galv.
¾ in. Butt..	—30	—13
1½ in. Butt..	—32	—15
2 in. Lap....	—27	—10
2½-6 in. Lap.	—30	—15
7-12 in. Lap..	—23	— 7

Steel Wire

BASE PRICE* ON NO. 9 GAGE AND COARSER	Per Lb.
Bright basic	3.50c. to 3.75c.
Annealed soft	3.50c. to 3.75c.
Galvanized annealed	4.25c. to 4.50c.
Coppered basic	4.00c. to 4.25c.
Tinned soft Bessemer	5.50c. to 5.75c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	16¾c. to 17¼c.
High brass wire	17¼c. to 17¾c.
Brass rod	14¾c. to 15¾c.
Brass tube, brazed	23¾c. to 24½c.
Brass tube, seamless	20 c. to 20½c.
Copper tube, seamless	22¼c. to 23¼c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 20¾c. to 21¾c. per lb. base.

Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.

Tin Plates

Bright Tin		Coke—14-20		
	Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20		Primes	Wasters
			80 lb..	$6.05	$5.80
			90 lb..	6.15	5.90
			100 lb..	6.25	6.00
IC..	$10.00	$8.50	IC..	6.40	6.15
IX..	11.50	10.00	IX..	7.40	7.15
IXX..	13.00	11.25	IXX..	8.40	8.15
IXXX..	14.25	12.50	IXXX..	9.40	9.15
IXXXX..	16.00	14.00	IXXXX..	10.40	10.15

Terne Plates

8-lb. coating, 14 x 20

100 lb.	$7.00
IC	7.25
IX	7.50
Fire door stock	9.00

Tin

Straits, pig	34½c.
Bar	41c. to 45c.

Copper

Lake ingot	15¼c.
Electrolytic	15 c.
Casting	14¾c.

Spelter and Sheet Zinc

Western spelter	6¾c. to 7c.
Sheet zinc, No. 9 base, casks	8½c. open 9c.

Lead and Solder*

American pig lead	6¾c. to 7c.
Bar lead	8c. to 8½c.
Solder, ½ and ½ guaranteed	25c.
No. 1 solder	23½c.
Refined solder	20¼c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb	75c.
Commercial grade, per lb	35c.
Grade D, per lb	25c.

Antimony

Asiatic	6½c. to 7c.

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb	25c. to 27c.

Old Metals

Business was not as active this week but values generally held fairly firm. Slight recessions by some holders of scrap were noted. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy crucible	11.75
Copper, heavy wire	11.25
Copper, light and bottoms	9.00
Brass, heavy	6.00
Brass, light	5.00
Heavy machine composition	8.50
No. 1 yellow brass turnings	6.00
No. 1 red brass or composition turnings	7.75
Lead, heavy	4.50
Lead, tea	3.25
Zinc	2.75